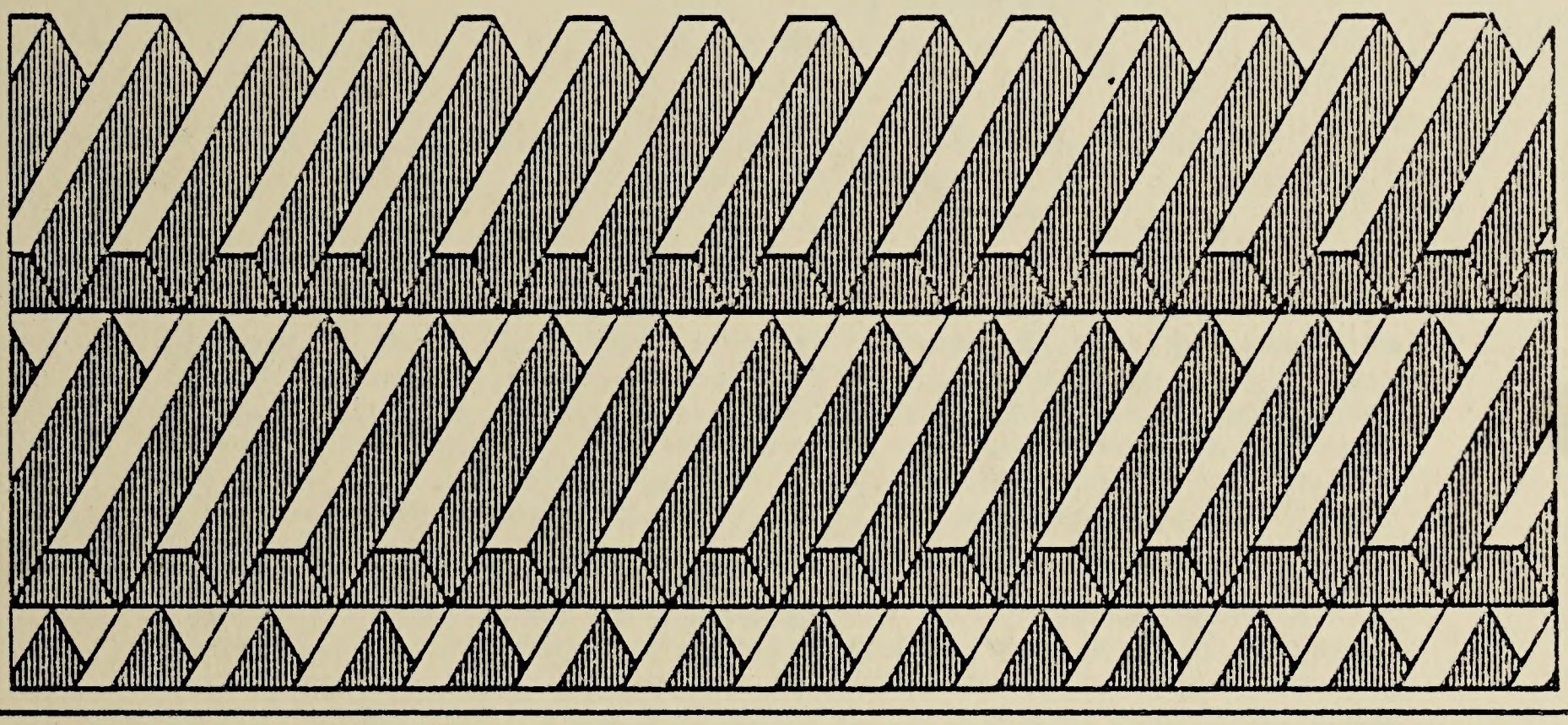
FINAL ENVIRONMENTAL ASSESSMENT



PARADISE PEAK PROJECT

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DECEMBER 1984

FINAL ENVIRONMENTAL ASSESSMENT
FMC CORPORATION'S PROPOSED PARADISE PEAK PROJECT

Prepared by: U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Tonopah Resource Area

With the Assistance of: ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
1716 Heath Parkway
Fort Collins, Colorado

Abstract: This Final Environmental Assessment (EA) presents the conclusions of environmental analyses of FMC Corporation's Paradise Peak Project, a precious metals extraction operation proposed in Nye County, Nevada. The Paradise Peak Project would involve the construction, operation, and abandonment of facilities for extracting and processing gold/silver ore. These include an open pit mine, processing facilities, waste rock disposal sites, a tailings impoundment, roads and ancillary facilities. The Proposed Project is described in a Plan of Operations submitted to the Bureau of Land Management (BLM), Tonopah Resource Area Office, which is responsible for reviewing the plan to determine compliance with BLM regulations governing surface mining under the general mining laws. As part of BLM's review process, this EA describes the projected impacts of the proposed mining operation on the natural and human environment. Based on public input and the design of the proposed facilities, the analysis emphasizes the following affected resources: air quality; groundwater quality and quantity; soils and reclamation potential; vegetation; wildlife; cultural resources; and the social and economic character of local communities. The analysis considers the No Action Alternative, three reclamation alternatives, three water supply options, and a land sale alternative.

Introduction

This Environmental Assessment (EA) presents the conclusions of environmental analyses of FMC Corporation's Paradise Peak Project, a precious metals extraction operation proposed in Nye County, Nevada about 8 miles south of the town of Gabbs. The Paradise Peak Project would involve the construction, operation, and abandonment of facilities for extracting and processing gold/silver ore. The Proposed Project is described in a Plan of Operations submitted to the Bureau of Land Management (BLM), Tonopah Resource Area Office, which is responsible for reviewing the plan to determine compliance with BLM regulations governing surface mining under the general mining laws. As part of BLM's review process, the EA describes the projected impacts of the proposed mining operation on the natural and human environment.

FMC proposes to mine approximately 1 million tons of ore per year and process the ore by a cyanide agitation leach method. The plant would produce 40,000 to 115,000 troy ounces of gold and 850,000 to 3,950,000 troy ounces of silver per year for 12 years of operations, based on current estimates of mineral reserves. Up to 200,000 pounds of mercury would be produced annually as a secondary by-product.

Major components of the project would include an open pit mine, mine waste dumps, process plant, tailings dam and impoundment, and access roads which would directly disturb 354 acres on FMC's claim block area. Additional project components, located offsite, would include a temporary 1.5-mile 60 kV electric transmission line, a permanent 20-mile 120 kV electric transmission line, a water supply system, and a buried telephone cable. Primary access to the mine site would be provided from Nevada State Highway 361 via a local county road known as the Poleline Road. An asphalt access road would be constructed from the Poleline Road to the plant Administration Building.

Alternatives to the proposed action are analyzed in the EA. Alternatives considered in detail in the analysis include: the No Action alternative; water supply alternatives; reclamation alternatives; and a land sale alternative. The EA also briefly documents several alternatives that were considered during early project design, or during

the environmental analysis, but which were eliminated from detailed consideration because they were judged unreasonable in the sense that they posed greater adverse environmental impacts than proposed plans or were found to be technically or economically infeasible.

Public Involvement

A public scoping process was conducted prior to preparing the EA. This process included mailings of public information documents, a 30-day written comment period, and three public meetings in potentially affected communities. The scoping process identified the following potentially affected resource areas for analysis in the EA:

- Socioeconomics and Community Resources
- Air Quality
- Water Quality
- Water Supply
- Geologic Hazards
- Paleontological Resources
- Wildlife
- Cultural Resources
- Recreation
- Vegetation
- Land Use and Livestock Grazing

The Draft Environmental Assessment was circulated for review by federal agencies, state agencies, and interested persons. The review process indicated broad support for the project. Letters of comment and responses to specific comments are included in Chapter 4 of the EA.

Finding of No Significant Impact

Based on the Environmental Assessment and the results of formal scoping and public review for the EA, BLM has concluded the proposed Paradise Peak Project will not result in significant impacts to the human environment. An Environmental Impact Statement will not be prepared. The major factors used by BLM in reaching the Finding of No Significant Impact are summarized in following paragraphs.

The Paradise Peak Project would be developed in a rural area of central Nevada. The project site and the general region have a long history of mining. Mining is formally recognized as an important and accepted land use by Nye County, Mineral County, and BLM land use plans. Mining plays an important role in the local economy and employment. The proposed project would provide important economic and employment benefits.

BLM conducted a formal public involvement program during preparation of the EA. This included mailings to interested persons and organizations, news releases, public scoping meetings, public review of the draft EA and meetings with local government officials. The public involvement program revealed broad public support for the proposed project.

The proposed project would meet the standards of BLM regulations governing surface management of public lands under the general mining laws (43 CFR 3809). Implementation of the project as described in FMC's Plan of Operations, including mitigation measures identified in the EA, would not result in the undue or unnecessary degradation of public lands. Specific conclusions with regard to individual resources are discussed below:

Air Resources

The Paradise Peak Project would emit particulate matter (PM), mercury, and minor amounts of other pollutants to the atmosphere. Projected emissions would meet applicable New Source Performance Standards and would comply with National Ambient Air Quality Standards. Air pollutant emissions and control technologies are subject to review and approval by the Nevada Division of Environmental Protection (NDEP). Pending NDEP concurrence, BLM has concluded that with the air pollution control measures proposed by FMC, the project will not significantly impact air resources.

Geology and Mineral Resources

The proposed project would extract economically valuable gold and silver resources. Mercury would be produced as a byproduct. Proposed designs for the tailings dam and other facilities recognize and account

for seismic and other geologic hazards in the area, eliminating the potential for adverse impacts. Slopes on proposed waste rock dumps could be unstable over the long term if left at the angle of repose. Proposed mitigation to reduce the slopes to 2:1 (run:rise) would reduce this potential so that no significant impacts would occur.

Paleontology

The proposed development would not directly impact important paleontological sites in the Stewart Valley. These sites could be indirectly impacted by increased surface disturbance and collecting associated with the increased population and human activity levels in the region. The BLM Walker Resource Area has proposed management measures to limit surface collection in important fossil occurrence areas. These measures will effectively limit impacts to paleontological resources.

Water Resources

The Paradise Peak Project would pump groundwater for use in the milling process. Modeling of aquifer drawdown indicates the potential for adverse impacts to the few existing groundwater users is minimal; at the worst case, existing groundwater users within approximately three miles could experience increased pump lifts. FMC has committed to monitoring groundwater levels and mitigating impacts to water users, if adverse impacts occur. This effectively eliminates the potential for significant impacts. Groundwater contamination from the tailings impoundment or other facilities is not expected to be significant because of the design of the proposed facilities and the lack of a regionally important aquifer beneath the site. The provision of the Nevada Water Pollution Control Permit will require FMC to monitor for potential seepage from the tailings area. Thus, no significant impacts would result.

Soils

The Proposed Project would unavoidably disturb soils on affected areas (approximately 354 acres). Salvageable topsoil resources within this area are estimated to be 670,000 cubic yards. Concern for topsoil

resources in the area is related primarily to its potential use in future revegetation efforts. Long term impacts would depend on the reclamation alternative selected. With Alternative A, a minimal level of reclamation would be undertaken, and long-term impacts of accelerated erosion and poor vegetation establishment would be likely to occur. Alternatives B and C would involve more intensive reclamation approaches, including topsoil salvage from selected areas, reapplication, and reseeding to reduce soils impacts to the extent possible and promote revegetation. Alternative B, as originally proposed, would apply this intensive reclamation approach to the tailings impoundment area. Under Alternative C, all disturbed areas would be revegetated. FMC and the BLM have agreed to a modification of Alternative B as the preferred alternative. This modification would add an experimental revegetation program to Alternative B to evaluate means of developing site-specific approaches for revegetating waste dumps without resoiling. The proposed approach offers a means of developing a practical reclamation plan that can use the best available technologies at the time reclamation will be implemented. Thus, significant impacts resulting from soil disturbance are not anticipated.

Vegetation

The proposed project site does not possess highly productive or unique vegetation communities. The mine/mill development would unavoidably disturb approximately 354 acres of desert shrub vegetation. Long-term impacts would be insignificant due to the agreement, described above, to develop and implement practical, site-specific reclamation measures.

A population of about 300 individuals of a rare plant. Asclepias eastwoodiana, would be eliminated by waste rock disposal. The plant species is known from 17 other locations in Nye, Lincoln, Lander, and Esmeralda counties so the elimination of the Paradise Peak population would not cause the species' extinction. FMC has agreed to, and implemented, an experimental transplant program to attempt to establish a new population in an unaffected area. Based on these efforts and informal consultation with the U.S. Fish and Wildlife Service, it is concluded that the adverse impacts to the Asclepias population are insignificant.

Wildlife

The proposed project site is not high value wildlife habitat, though it is used by nesting raptors, songbirds, and small mammals. Impacts to nesting raptors are not anticipated due to the distance of nests from disturbance sites, except for the possible disturbance of a prairie falcon nest near the Kelly Wells water supply pipeline. Wildlife would be impacted by habitat loss, increased human disturbance and possibly by exposure to tailings materials. Proposed mitigation and monitoring measures will effectively limit these impacts to insignificant levels.

Land Use, Recreation, and Wilderness

No outdoor recreation sites, wilderness areas, or wilderness study areas would be affected. Land use at the site would be converted to industrial use during the project life. This would be consistent with BLM and Nye County land use plans. Post-mining land use would return the land to rangeland/wildlife habitat with the reclamation measures agreed to by BLM and FMC.

Cultural Resources

Cultural resource sites were discovered on the Paradise Peak project area during preparation of the EA. A testing, evaluation, and mitigation program was designed and implemented in consultation with the BLM and the Nevada Department of Historic Preservation and Archaeology (NDHPA). Based on this program, it was determined that one site that could be indirectly impacted by the project is significant and eligible for the National Register of Historic Places. FMC, BLM, and NDHPA have agreed to develop a long-term management plan for this site to protect it from significant impact.

Visual Resources

The mine/mill development would unavoidably alter the visual character of the project site. This alteration would be insignificant because the site is located in an isolated area of undistinguished visual quality (BLM Class IV) and proposed alterations would be acceptable in terms of BLM Visual Resource Management guidelines.

Socioeconomics

Development of the Paradise Peak project would result in important beneficial impacts to local communities. Both Nye and Mineral Counties would experience increasing employment, while increased tax revenues would accrue to Nye County. Moderate population increases associated with the project will increase demand for housing and public service. Socioeconomic analyses indicate this demand will not significantly impact existing service capabilities and facilities. Mineral County and the town of Hawthorne are expected to experience the greatest demand for additional services since the majority of the population increase is expected to locate in Hawthorne. Since Mineral County will not share in the property or net proceeds tax receipts from the project, the additional demand for services would result in added fiscal burden. The Mineral County commissioners have expressed support for the project and assurance that the County can adequately cope with the adverse impact. Worst case projections of housing shortages of 26 to 79 units would also result in adverse impacts. FMC has committed to monitoring the housing supply and working with private developers to provide housing as the project proceeds.

Agency Preferred Alternative

The EA analyzes several alternatives to the proposed action: the No Action alternative; three water supply alternatives; three reclamation alternatives; and a land sale alternative. BLM's preferred alternative consists of the following:

- Approval of FMC's proposed Plan of Operations for the mine and mill development, with mitigation measures specified in the EA.
- Development of the South Wellfield Water Supply Alternative.
- Implementation of Reclamation Alternative B, with mitigation measures specified in the EA.
- Deferral of a decision on the Land Sale Alternative until a specific proposal is made by FMC and additional environmental analyses are conducted.
- Approval of Rights-of-Way applications submitted by Sierra Pacific Power Company for the temporary and permanent electric transmission lines.

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PURPOSE AND NEED FOR ACTION

This Final Environmental Assessment (EA) presents the conclusions of environmental analyses of FMC Corporation's (FMC) Paradise Peak Project, a precious metals extraction operation proposed in Nye County, Nevada, about 8 miles south of the Town of Gabbs. The Paradise Peak Project would involve the construction, operation, and abandonment of an open pit mine and processing facilities for gold/silver ore. Approximately 12 million tons of ore would be mined during the 12-year operations period, with total precious metals production estimated at 1 million ounces of gold and 30 million ounces of silver. Approximately 2.4 million pounds of mercury would also be extracted as a byproduct of the primary mining operation for gold and silver.

Gold and silver are major commodities on domestic and foreign markets with extensive industrial and commercial uses. Demand in the United States has exceeded domestic production from new mines and scrap recovery in recent years, and the difference has been met with imports or reduction of existing inventories. The demand for precious metals is expected to continue, if not increase, for the remainder of the century. Additional domestic production such as the proposed action, would reduce the need to import gold and silver and would improve the country's foreign trade balance.

FMC's proposed operations are described in a Plan of Operations submitted July 30, 1984, to the Bureau of Land Management (BLM), Tonopah Resource Area Office. Because the proposed mine and processing facilities would be located on unpatented mining claims administered by BLM, the operations are required to comply with procedures and standards described in BLM regulations for Surface Mining under the General Mining Laws (43 CFR 3809). These regulations recognize the statutory right of mineral claim holders to develop federal mineral resources and encourage such development consistent with the Mining and Mineral Policy Act of 1970 and the Federal Land Policy and Management Act. The regulations require BLM to review proposed operations to ensure that : 1) adequate provisions are included to prevent undue and unnecessary degradation of federal lands, 2) measures are included to provide for reasonable reclamation, and 3) the proposed operations will comply with other applicable federal, state, and local laws and regulations.

This Final EA was prepared according to BLM regulations (43 CFR 3809.2) and the implementing regulations (40 CFR 1505) for the National Environmental Policy Act (NEPA). The purposes of the EA are to assess the potential environmental impacts of the proposed mine and mill development, to determine if an Environmental Impact Statement (EIS) is required, and to aid the BLM authorized officer in his review of FMC's proposed Plan of Operations.

1.0 ALTERNATIVES INCLUDING THE PROPOSED PROJECT

1.1 Introduction

Chapter 1 of the Final Environmental Assessment (EA) summarizes FMC Corporations's (FMC) plan for developing the Paradise Peak Project, a precious metals extraction operation proposed in Nye County, Nevada, about 8 miles south of the town of Gabbs (Figure 1-1). FMC's proposed action is to develop and operate the necessary facilities for mining approximately 12 million tons of ore to extract an estimated total of 1 million ounces of gold and 30 million ounces of silver over the 12 years of operations. Approximately 2.4 million pounds of mercury would also be extracted as a byproduct of the primary mining operation for gold and silver.

The proposed Paradise Peak Project would be located on unpatented mining claims administered by the Bureau of Land Management (BLM), Tonopah Resource Area, Battle Mountain District Office. As such, the proposed development is required to comply with procedures and standards described in BLM regulations for Surface Mining under the General Mining Laws (43 CFR 3809). As required by these regulations, FMC submitted on July 30, 1984, a Plan of Operations for BLM review, comment, and approval. The federal action considered in the EA is to approve FMC's Plan of Operations, subject to modifications that may be required to ensure that the proposed operations would not result in the undue or unnecessary degradation of federal lands.

FMC's overall development plan would also require construction of a temporary 60 kilovolt (kV) transmission line to supply electric power to the mine site during construction and a permanent 120 kV electric transmission line to supply electric power during operations. FMC has contracted Sierra Pacific Power Company to construct the transmission lines and supply electric power. The proposed transmission line routes would cross BLM lands and would require right-of-way grants from the BLM Walker Resource Area, Carson City District Office. Sierra Pacific Power Company submitted right-of-way applications to BLM on June 15, 1984. Separate EAs (Sierra Pacific Power Company 1984a and 1984b) on the

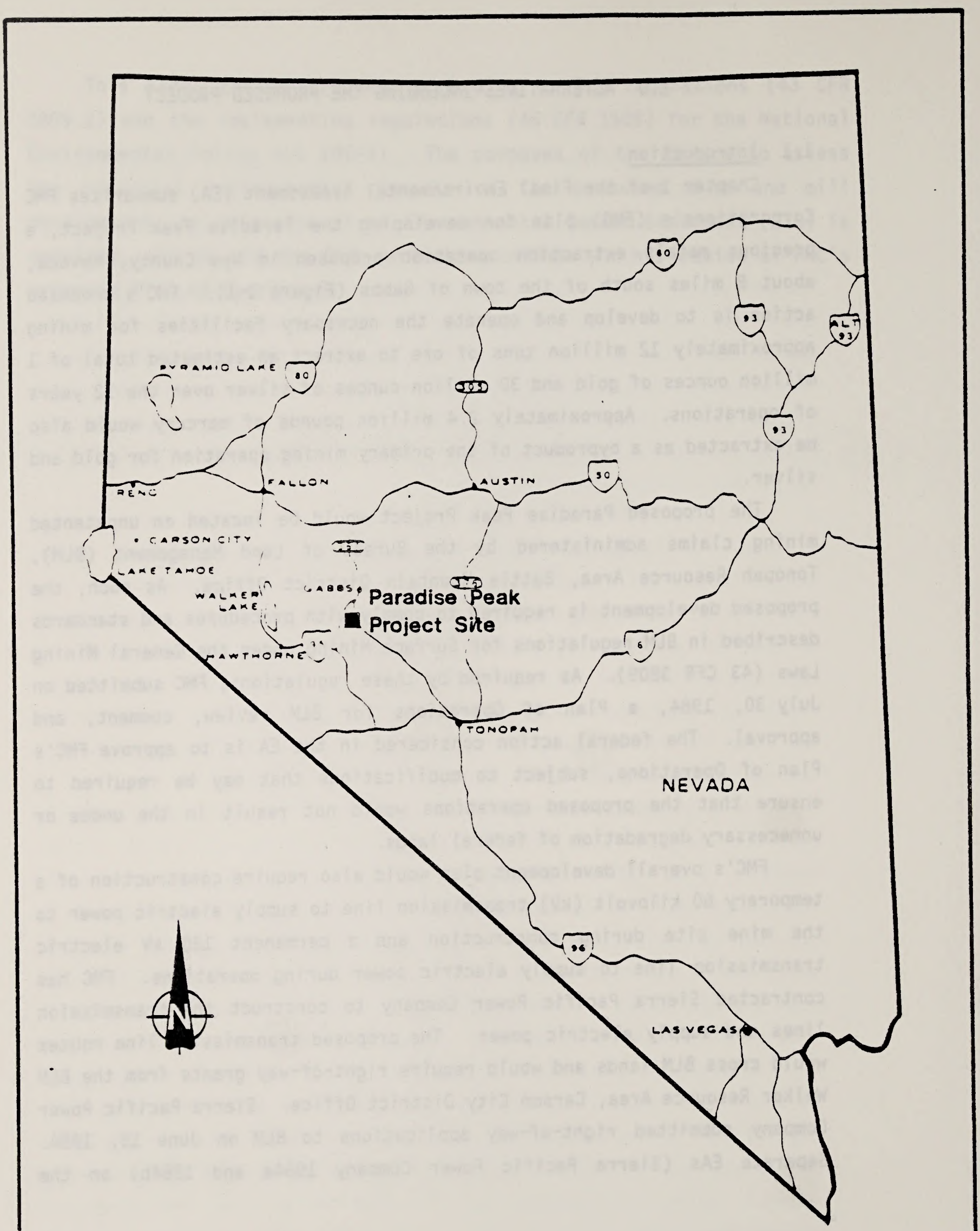


Figure 1-1
General Location Map for Paradise Peak Project

Source: Davy McKee 1984

transmission lines were prepared by Sierra Pacific Power Company and the BLM Carson City District Office. The results of the assessments are incorporated by reference, and briefly summarized where appropriate, in this EA. These assessments are on file in the BLM Carson City District Office.

The description of the Paradise Peak Project presented in Section 1.2 is based on FMC's Plan of Operations dated July 30, 1984, on file with the BLM, Tonopah Resource Area. The Plan of Operations is incorporated by reference into this EA. The proposed Plan of Operations is supported by preliminary and conceptual engineering which may be modified based on ongoing design engineering or the requirements of other federal, state, or local agencies with permitting or review authority (Table 1-1). Future amendments to the Plan of Operations will be evaluated by the BLM to determine compliance with the applicable standards of 43 CFR 3809.

Alternatives to the Proposed Project are also described in this Chapter. Section 1.3 describes several alternatives considered in detail in the analysis including: the No Action Alternative; water supply alternatives; reclamation alternatives; and a land sale alternative. Section 1.4 briefly documents several alternatives that were considered during preliminary project design or during the environmental analysis, but which were eliminated from detailed consideration due to adverse environmental impacts or technical or economic feasibility.

1.2 Description of the Proposed Project

1.2.1 Overview

The Paradise Peak Project would involve the construction, operation, and abandonment of an open pit mine, processing plant, and other facilities necessary to extract and process gold/silver ore. FMC proposes to mine approximately 1 million tons of ore per year and process the ore by a cyanide agitation leach method. The plant would produce 40,000 to 115,000 troy ounces of gold and 850,000 to 3,950,000 troy ounces of silver per year for 12 years of operations, based on current estimates of mineral reserves. Up to 200,000 pounds of mercury would be produced annually as a secondary by-product.

TABLE 1-1

MAJOR PERMITS AND AUTHORIZING ACTIONS REQUIRED FOR THE PARADISE PEAK PROJECT

Agency	Required Permit or Authorization
FEDERAL	
Bureau of Land Management	Approval of Plan of Operation for Mine/Mill Right-of-Way Grant for Transmission Lines
Fish and Wildlife Service	Compliance with Endangered Species Act Compliance with Eagle Protection Act
STATE	
Department of Conservation and Natural Resources Division of Environmental Protection	Air Quality Registration Certificate (Permit to Construct) Air Quality Permit to Operate
Division of Water Resources	Approval to Operate a Solid Waste System Water Pollution Control Permit
Nevada State Engineer	Permit to Appropriate Public Waters Permit to Construct Tailings Dam
Department of Wildlife	Modification of Habitat Permit

Major components of the project would include an open pit mine, low grade ore stockpile, mine waste dumps, process plant, tailings dam and impoundment, and access roads which would directly disturb 354 acres (Table 1-2) within an "area of concern" (Figure 1-2) of approximately 3,815 acres. The area of concern includes the mine site and an approximate 1-mile buffer area. FMC is continuing mineral exploration activities within the mine site area of concern. Additional project components, located outside the primary "area of concern", would include a temporary 1.5-mile 60 kV electric transmission line, a permanent 20-mile 120 kV electric transmission line, a water supply pipeline and wellfield, an electric distribution line to the wellfield, and a buried telephone cable (Figure 1-2). Primary access to the mine site would be provided from Nevada State Highway 361 via a local county road known as the Poleline Road. An asphalt access road would be constructed from the Poleline Road to the plant Administration Building.

The site layout for the mine site project components is shown in Figure 1-3. The open pit mine would be the source of approximately 1.0 million tons of ore and 1.4 million tons of low grade ore and waste rock per year for 12 years. Low grade ore would be stockpiled in the low grade ore stockpile for possible future processing. Two waste rock dumps would be used for waste rock with little potential for future precious metals extraction. Ore would be hauled to the mill site for processing. The ore would be crushed, ground, and then chemically treated to remove the precious metals and ready them for transport. Waste from the mill process would be stored in the tailings pond.

The entire project, including construction, operation, and abandonment, would have an estimated life of 14 years. The initial construction effort would begin in January 1985 and require approximately 14 months. Mine and plant operations would begin in May 1986 and continue through 1998. If feasible, FMC would continue to use processing facilities to process ore from other mineral deposits that might be discovered, or would sell the facilities to another mining company. If future use of the facilities is not possible, abandonment would occur after 1998. FMC would remove buildings and other surface facilities and reclaim disturbed areas, as required by BLM and Nevada state agencies. The length of the abandonment phase would vary, depending on the reclamation approach eventually selected and its success.

TABLE 1-2

ESTIMATED LAND REQUIREMENTS FOR THE PARADISE PEAK PROJECT

Project Component	Land Requirement (Acres)
Mine/Mill Complex	
Mine	42
Low Grade Ore Stockpile	22
Waste Dump (SW)	45
Waste Dump (N)	46
Process Plant	35
Tailings Dam and Impoundment	135
Access Road	11
Tailings Dam Road	3
Solid Waste Disposal	15
Mine/Mill Total	354
Water Supply System[1]	7 to 12
120 kV Transmission Line[2]	<1

[1]Assumes 20-foot wide disturbance area for pipeline installation, and 30-foot wide disturbance area for access road. Estimate varies from 12 acres for the Kelly Wells Alternative (which would not require a separate access road) to 17 acres for the South Wellfield Alternative, to 30 acres for the Graben wellfield.

[2]Right-of-way width would be 100 feet. Actual disturbance estimated to be 25 ft^2 at each pole location.

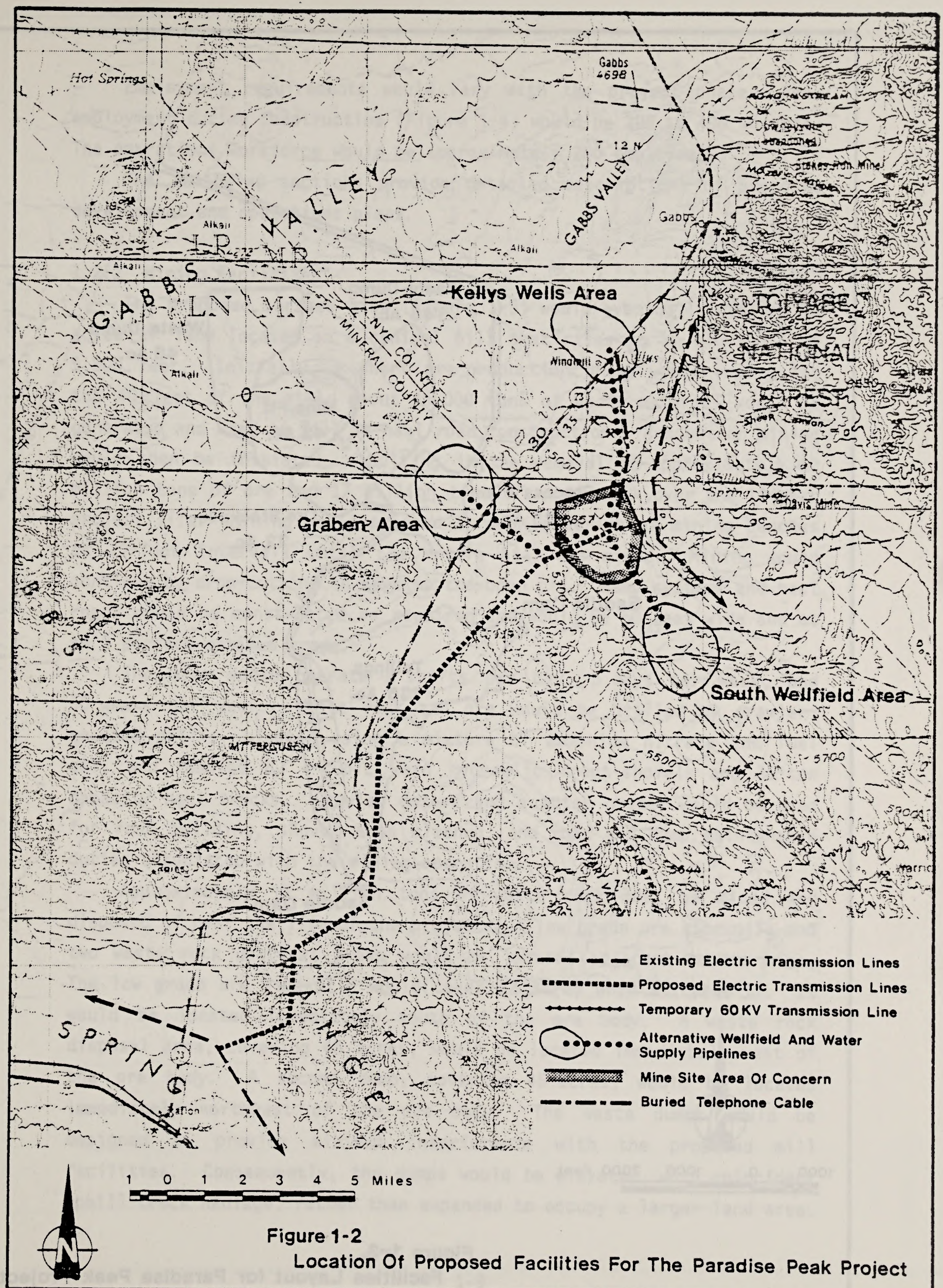


Figure 1-2
Location Of Proposed Facilities For The Paradise Peak Project

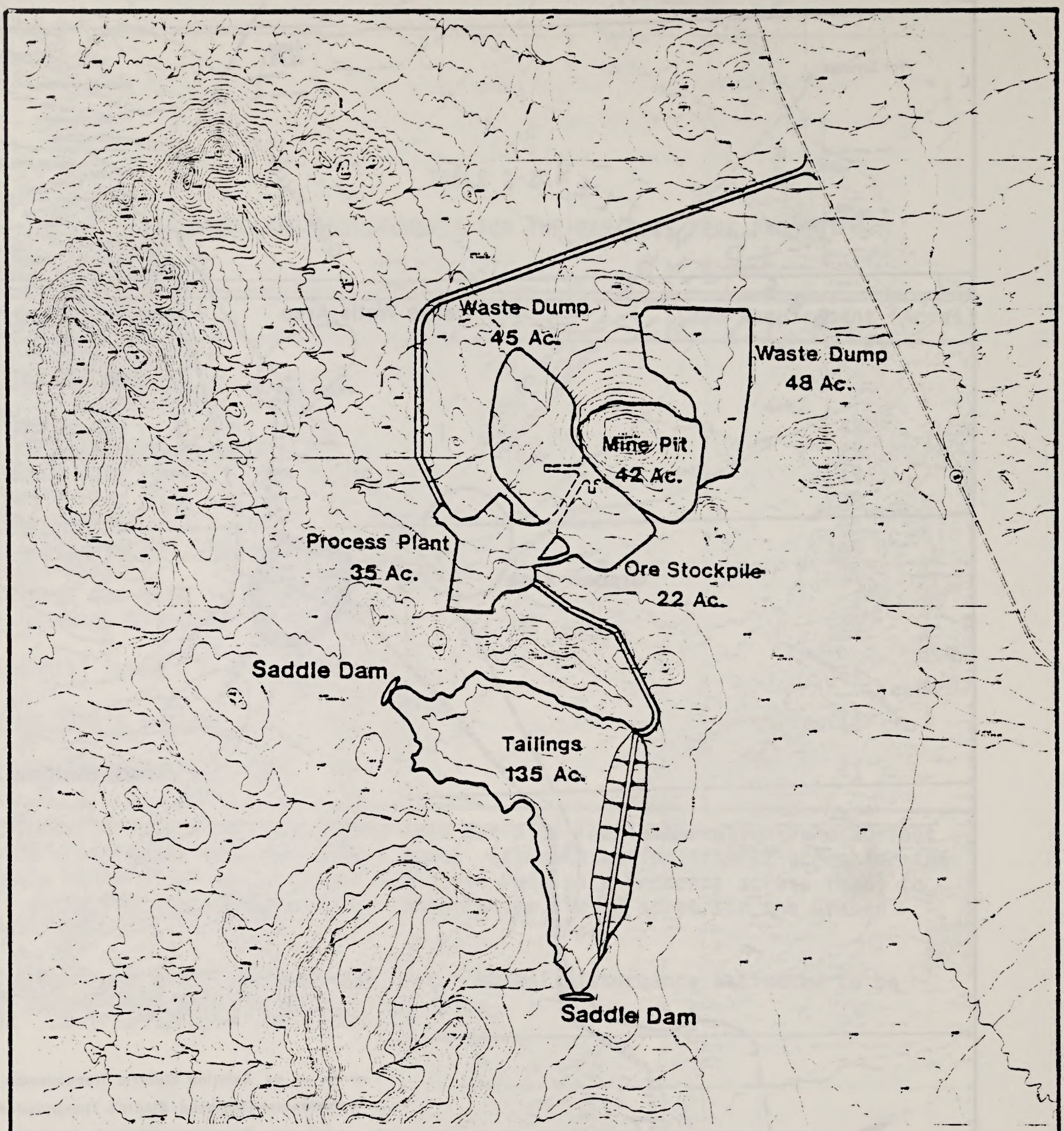


Figure 1-3.
Facilities Layout for Paradise Peak Project

Source: ERT 1984

Employment requirements would vary with the project phase. Peak employment during construction (Figure 1-4) would be 300 to 400 workers. The operations workforce would be approximately 200 employees.

The following sections provide detailed descriptions of proposed development and operations plans.

1.2.2 Mining Facilities

The proposed surface mine (Figure 1-5) would eventually disturb 42 acres of land located on a conical hill that rises to an elevation of 5,500 feet. Initially, a short pre-production phase would remove the top 40 feet of the hill; about 45,000 tons of waste material would be generated and used as fill in haul road construction. Production mining would then be initiated, resulting in the removal of approximately 12 million tons of ore and 17 million tons of waste rock over the 12-year project life. Mining would proceed through a series of mining benches at 20-foot intervals until the entire hill was mined. Mining would continue by drop-cutting to develop the open pit. Ramp systems and haul roads would be constructed as required and would be 50 feet wide and at an 8 percent maximum grade.

The mine would operate 2 shifts per day, 5 days per week, and 50 weeks per year. Waste rock and ore would be drilled by crawler-mounted drills, blasted using a mixture of ammonium nitrate and fuel oil, and removed by 4-cubic yard hydraulic front-shovels and 35-ton capacity haul trucks. Crawler dozers and a motor grader would be used for road building, shovel area cleanup, and road and dump maintenance duties associated with the mining operation.

Approximately 17 million tons of waste rock must be mined and disposed of over the life of the project. A low grade ore stockpile and two waste rock disposal areas would be located adjacent to the mine. The low grade ore stockpile would cover 22 acres when at capacity. It would be located immediately south of the ore body. A waste rock disposal area, covering 45 acres, would be located immediately west of the ore body. A second dump, covering 46 acres, would be located immediately northeast of the ore body. The waste dumps would be designed to provide minimum interference with the proposed mill facilities. Consequently, the dumps would be elevated, with coincident uphill truck haulage, rather than expanded to occupy a larger land area.

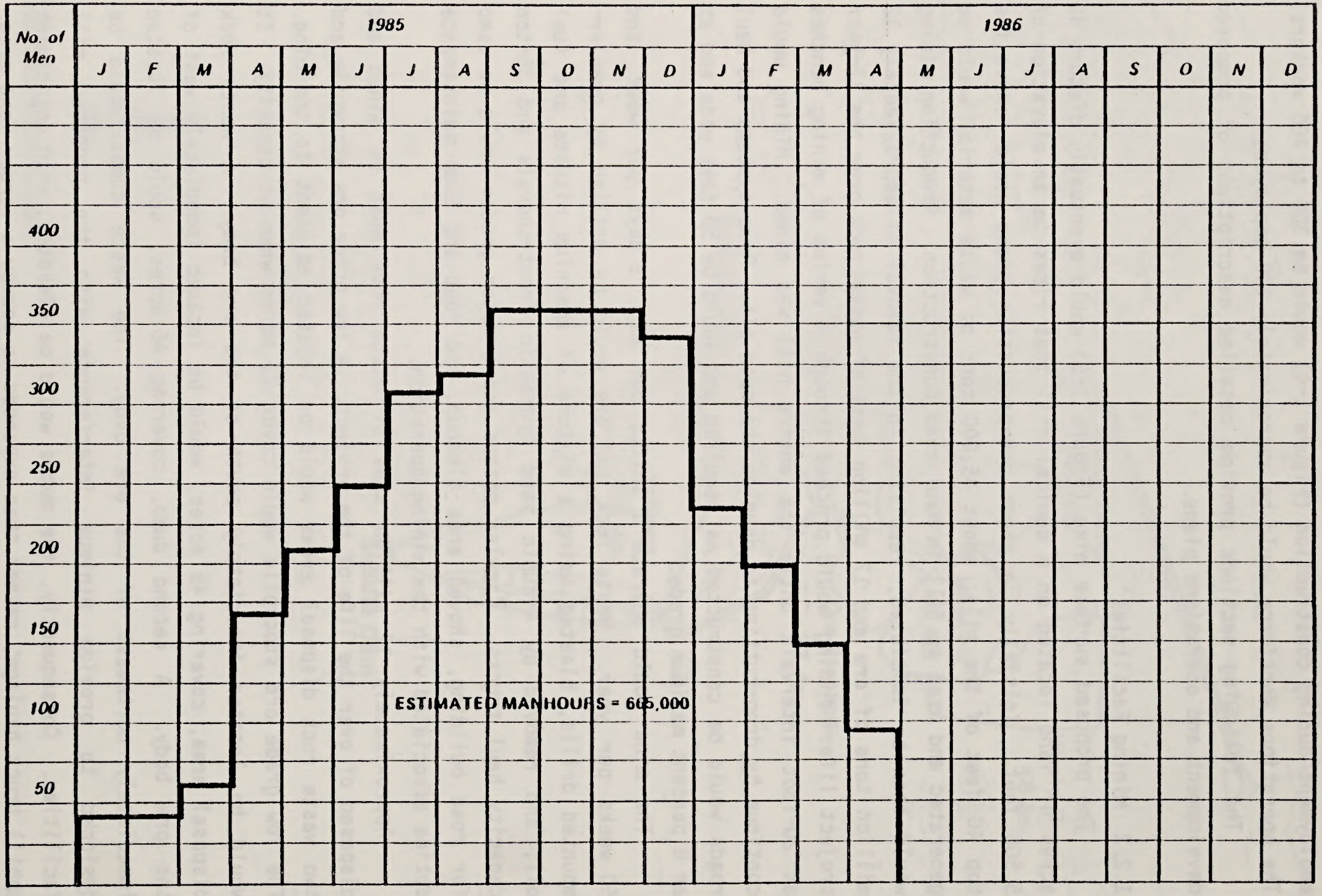


Figure 1-4
Paradise Peak Project Construction Manpower

Source: Davy McKee 1984

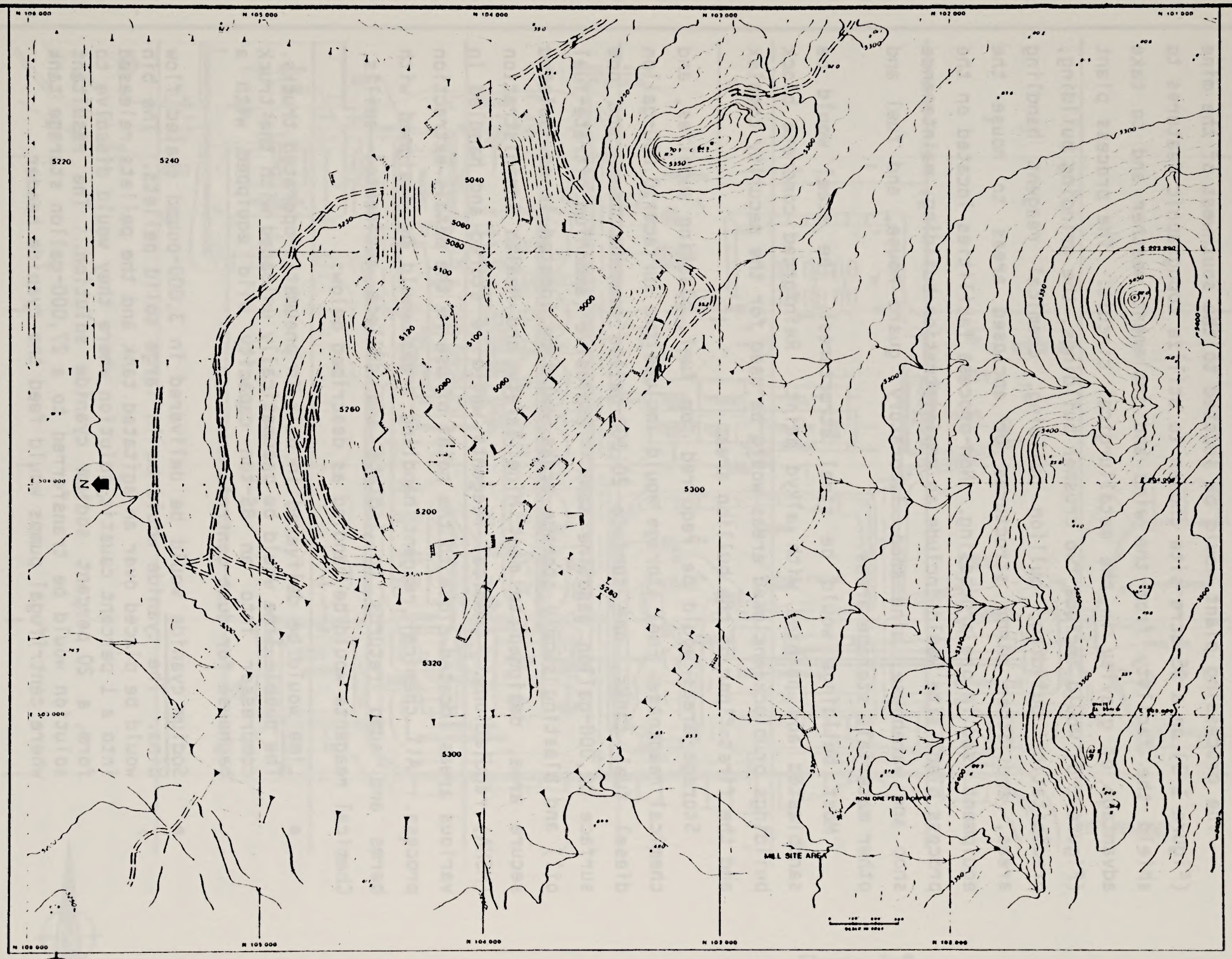


Figure 1-5
End of Life Mine Configuration for Paradise Peak Project

Source: Pincock, Allen, & Holt, Inc. 1984

1.2.3 Processing Facilities

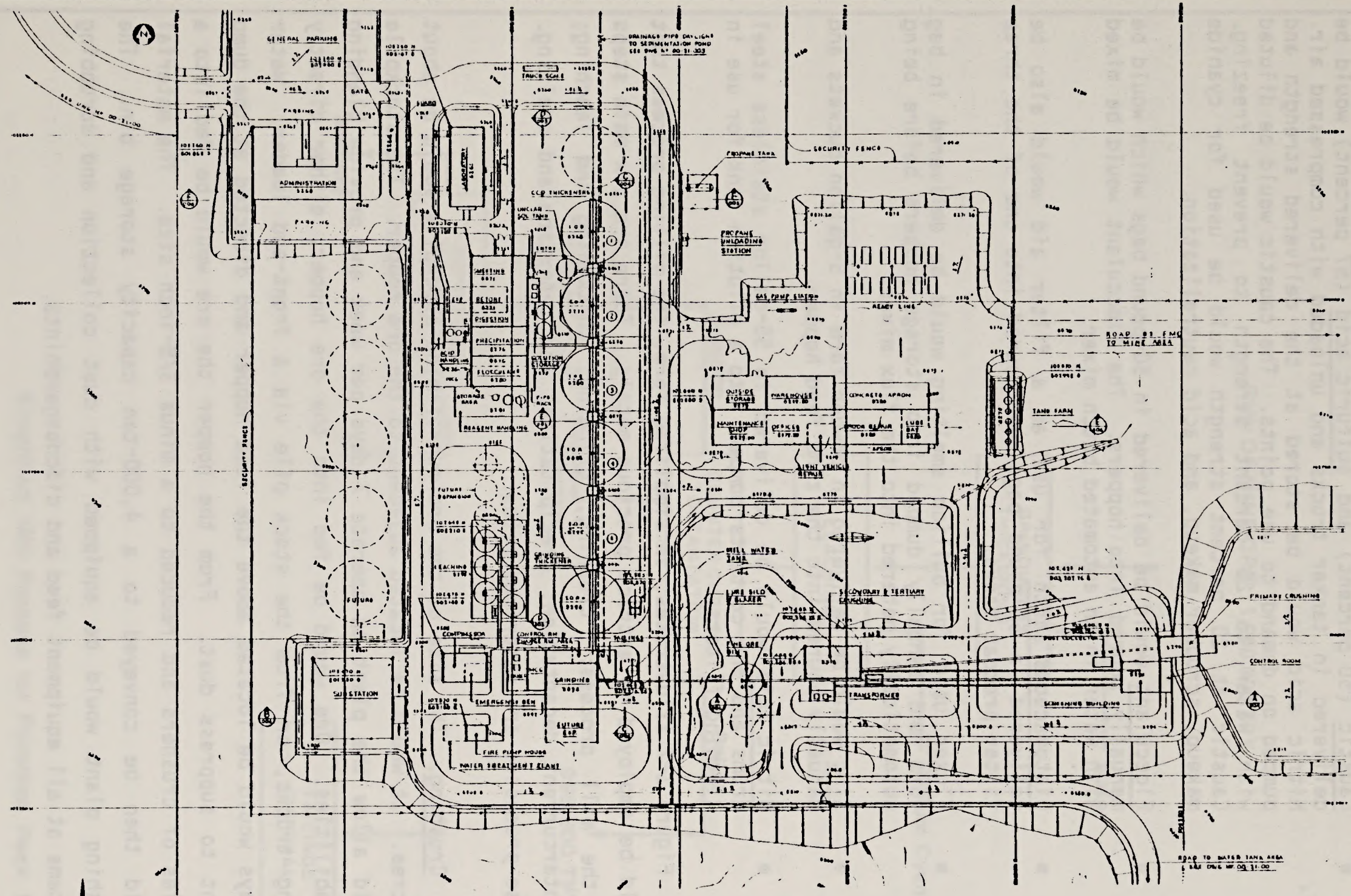
The processing plant would be located to the southwest of the mine (Figure 1-3) on a 35-acre site chosen to utilize topographic features to shield the facility from the wind and inclement weather and to take advantage of gravity in the metallurgical circuit. The process plant (Figure 1-6) would include two crusher buildings, the grinding building, precipitation building, bullion building, chemical reagent handling areas, and other minor structures or enclosed areas to house the equipment used in ore processing. Non-process facilities located on the process plant site would include an administration building, maintenance shop and warehouse, mine shop, laboratory, guard house, and fuel and other materials storage areas.

Most buildings would be steel structures. The steel would be sandblasted and painted with alkyd paint. Reinforced concrete block buildings or block-enclosed areas would be used for the security complex and the first floor of the bullion area.

Storage areas would be required for fuel, blasting supplies, and chemical reagents. Fuel storage would include two surface 10,000-gallon diesel fuel tanks, one surface 20,000-gallon propane tank, and one surface 12,000-gallon gasoline tank. Explosive (ammonium nitrate-fuel oil) and blasting supply storage areas would be located in an isolated secure area, designed to meet Mine Safety and Health Administration (MSHA) regulations. Chemical reagents would be stored and handled in various areas located close to the point of use in the metals extraction process. All chemical reagent handling areas would be designed with berms and sump returns to isolate and collect accidental spills. Chemical reagents would be handled as described below:

- Lime would be delivered in bulk in pneumatic-operated trucks. The pebble lime would be pneumatically unloaded with the truck compressor into an 85-ton capacity silo equipped with a baghouse for dust control.

- Sodium cyanide would be delivered in 3,000-pound sealed flow bins. The cyanide would be in large solid pellets. The bin would be placed over an agitated tank and the pellets released into a 1 percent caustic solution where they would dissolve to form a 20 percent sodium cyanide solution. The resultant solution would be transferred to a 27,000-gallon storage tank where centrifugal pumps would feed the cyanide header.



Source: Davy McKee 1984

Figure 1-6.
Mill Plot Plan for Paradise Peak Project

- Caustic (50 percent) and sulfuric acid (67 percent) would be delivered in tanker trucks and unloaded with compressed air. Nitric acid would be stored at the delivered strength and pumped on demand to use points. The caustic would be diluted with water to 20 percent strength to prevent freezing. Caustic at 20 percent strength would be used for cyanide makeup, scrubber makeup, and acid neutralization.

- Flocculant would be delivered in 50-pound bags which would be manually poured into hoppers. The flocculant would be mixed with water in an automated batch mixer.

- Diatomaceous earth for use as a filter aid would also be delivered in 50-pound bags and poured into one of the three filter precoat tanks.

- Fluxes used for bullion smelting would be delivered in bag form and manually dumped into storage hoppers before being automatically metered into the flux mixer.

- Zinc would be delivered in powder form in 5-gallon buckets and manually poured into the zinc feed hopper.

- Nitric acid would be delivered in 55-gallon stainless steel drums and the contents pumped into a dilution tank for use in cleaning filters.

Figure 1-7 illustrates, in simplifed form, the milling process that would be employed to extract precious metals. There are six main steps in the mill process: crushing; grinding; thickening and leaching; countercurrent decantation; precipitation; and retorting and smelting. These processes are described below:

Crushing. The size of the ore run-of-mine stockpile would be about 2 acres. It would be located adjacent to the ore hopper. The stockpile would allow the plant to operate 7 days per week and provide blending capabilities. Ore would be fed into the ore hopper, either directly using trucks, or from the stock pile via a front-end loader. Water sprays would be located above the feed hopper and directed at the dump point to suppress dust. From the hopper the ore would be fed into a series of crushers and reduced to a minus 3/8-inch size. The material would then be conveyed to a 4,000-ton capacity storage bin. The crushing plant would be equipped with dust collection and scrubbing systems at all equipment feed and discharge points.

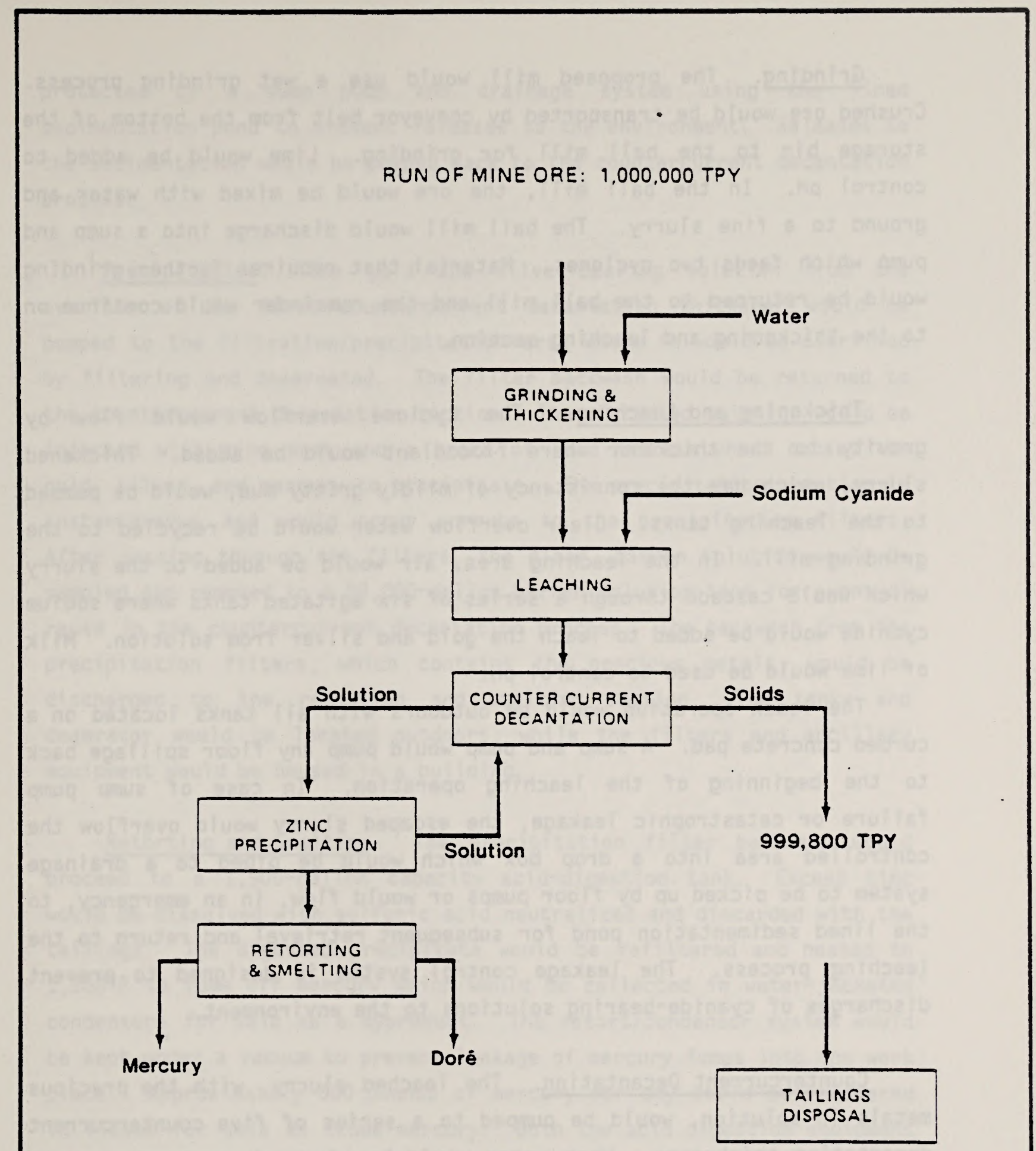


Figure 1-7
Simplified Mill Process for Paradise Peak Project

Source: Davy McKee 1984

Grinding. The proposed mill would use a wet grinding process. Crushed ore would be transported by conveyor belt from the bottom of the storage bin to the ball mill for grinding. Lime would be added to control pH. In the ball mill, the ore would be mixed with water and ground to a fine slurry. The ball mill would discharge into a sump and pump which feeds two cyclones. Material that requires further grinding would be returned to the ball mill and the remainder would continue on to the thickening and leaching section.

Thickening and Leaching. The cyclone overflow would flow by gravity to the thickener where flocculant would be added. Thickened slurry, which has the consistency of mildly gritty mud, would be pumped to the leaching tanks. Clear overflow water would be recycled to the grinding mill. In the leaching area, air would be added to the slurry which would cascade through a series of six agitated tanks where sodium cyanide would be added to leach the gold and silver from solution. Milk of lime would be used to control pH.

The leach operation would be outdoors with all tanks located on a curbed concrete pad. A sump and pump would pump any floor spillage back to the beginning of the leaching operation. In case of sump pump failure or catastrophic leakage, the escaped slurry would overflow the controlled area into a drop box which would be piped to a drainage system to be picked up by floor pumps or would flow, in an emergency, to the lined sedimentation pond for subsequent retrieval and return to the leaching process. The leakage control system is designed to prevent discharges of cyanide-bearing solutions to the environment.

Countercurrent Decantation. The leached slurry, with the precious metals in solution, would be pumped to a series of five countercurrent decantation thickeners. Wash water would be advanced countercurrent to the slurry and mixed in a 4:1 water:slurry ratio. The diluted slurry would be rethickened between each of the washing stages. Through this series of stages, essentially all of the precious metals in solution would be washed from the solids. The remaining solids are tailings and would be pumped to the tailings pond. As with the thickening and leaching section, the countercurrent decantation section would be

protected by a sump pump and drainage system using the lined sedimentation pond to prevent releases to the environment. Releases to the sedimentation would be pumped back to the countercurrent decantation process.

Precipitation. The gold and silver-bearing solution from the overflow of the first countercurrent decantation thickener would be pumped to the filtration/precipitation area where it would be clarified by filtering and deaereated. The filter backwash would be returned to the countercurrent decantation section. The clarified solution would be injected with zinc dust and a trace of lead nitrate which causes the gold, silver, and mercury to precipitate. The precipitation reaction is instantaneous and would occur enroute to the precipitation filters. After passing through the filters, the clear, barren solution would be sampled and removed to a 50,000-gallon barren solution tank for eventual reuse in the countercurrent decantation process. The backwash from the precipitation filters, which contains the precious metals, would be discharged to the retorting and smelting section. The tanks and deaerator would be located outdoors, while the filters and ancillary equipment would be housed in a building.

Retorting and Smelting. The precipitation filter backwash would proceed to a 1,900-gallon capacity acid-digestion tank. Excess zinc would be dissolved with sulfuric acid neutralized and discarded with the tailings. The digested precipitate would be refiltered and heated to 1,300°F to fume off mercury which would be collected in water-jacketed condensors for sale as a byproduct. The retort/condensor system would be kept under a vacuum to prevent leakage of mercury fumes into the work place. Approximately 600 pounds of mercury per day would be recovered in flasks for sale as crude mercury. Both the acid digestion equipment and mercury retort/condenser system would be operated in a controlled environment to prevent leakage of mercury fumes.

The mercury-free precious metals would be mixed with flux and smelted in a furnace which would be heated to approximately 2,300 °F. Molten gold and silver would sink to the bottom of the melt while impurities such as iron, nickel, and copper would go into the slag and

rise to the top. The melt would be poured into button molds and the resultant metal buttons separated from the slag. The slag would be processed to remove metal prills and sold to a lead smelter. The metal buttons would be remelted in a smaller induction furnace and poured into bars. Approximately eighteen 1,000-ounce bars of dore (combined gold and silver metal) would be produced each day. Each bar would be sampled, weighed, stamped, and stored in the vault for sale and shipment to a refinery. The bullion area would operate on day shift on a five-day-per-week basis with smelting on four days per week.

1.2.4 Tailings Dam and Impoundment

The precious metals extraction process would separate gold, silver, and mercury from the valueless portions of the ore. The remaining tailings (fine rock particles, combined with process water and chemical reagents used in processing) would be pumped from the process plant and stored in the tailings impoundment located south of the mine in a generally flat-lying area (Figure 1-3). Tailings would be pumped to the impoundment through a 10-inch high-density polyethylene pipe laid on the surface next to the access road to the tailings impoundment. The pipeline system would be equipped with a flow sensing device at the highest point along the route. If a sudden decrease in flow were detected, the tailings pump would automatically shut down.

Detailed design information for the dam and impoundment is contained in a report by Harding, Lawson, and Associates (1984d). A conceptual design described in the Plan of Operations has been discussed with the Nevada State Engineer's office and the Division of Environmental Protection. Final design will require approval of the State Engineer's Office and the Division of Environmental Protection.

The dam is designed as a homogenous earth filled structure with no zones. The dam would be constructed in two stages. The initial dam would be sufficient to impound 4 million tons of tailings and would be approximately 85 feet high. The second stage would impound an additional 8.0 million tons and would raise the dam height to a maximum of 130 feet. Two small 20 foot high saddle dams would be required for the second stage. The dam's shell materials would be obtained from within the impoundment area, a borrow pit downslope and adjacent to the dam, or from mine waste rock.

The tailings impoundment area would be lined to limit seepage of tailings liquids. Based on discussions with the Nevada Division of Environmental Protection, FMC established a liner design criterion to limit uniform permeability to 5×10^{-7} centimeters per second with an absolute maximum permeability of 1.0×10^{-6} centimeters per second. FMC evaluated several methods of meeting this design criterion. Based upon site-specific design considerations, the tailings impoundment would be lined with 40 to 100-mil high density polyethylene synthetic liner. The liner would be placed on a prepared bed of soil stripped of vegetation and rock projections. Rock outcrops would be mantled with soil moved from areas of excess soil in the tailings impoundment area. The in place liner would be much less permeable than the NDEP design criterion and would be highly effective in containing potential seepage from the impoundment. Under laboratory conditions, the liner permeability ranges from 1×10^{-11} to 1×10^{-12} centimeters per second.

1.2.5 Electrical Power

FMC has contracted Sierra Pacific Power Company to supply electric power to the Paradise Peak Project. Sierra Pacific has applied with the BLM Carson City District Office for rights-of-way grants to construct both temporary and permanent electric transmission lines to supply power to the mine/mill site (Figure 1-2). The environmental effects of these transmission lines are described in separate EAs (Sierra Pacific Power Company 1984a and 1984b) on file with the BLM Carson City District Office.

For the construction phase, Sierra Pacific would tap the existing 60 kV transmission line that supplies Gabbs and construct a temporary 1.5-mile long 60 kV transmission line to the mine/mill site (Figure 1-2). It would be a single wood pole-streamline configuration with average span length of 600 feet, using butt-treated western red cedar poles, non-specular conductor, and sky gray insulators. The line would be constructed using overland travel construction techniques.

The permanent electric transmission line would tap an existing 120 kV line near Luning and travel north 20 miles to the mine/mill site (Figure 1-2). The permanent transmission line would use an H-frame

configuration on butt-treated western red cedar poles with a steel cross arm, non-specular conductor, and sky gray insulators. The average span length would be 800 feet. Overland travel construction techniques would be used, except where rough topography requires construction of an access road and pads for tower structures.

The estimated average operating load of the processing plant would be five megawatts. Electrical power would be delivered to the main plant substation at 120 kV by Sierra Pacific Power Company. The main plant substation would include a 10 MVA transformer and an outdoor 4.16 kV metal-clad switchgear. It would be located adjacent to the plant area (Figure 1-6) and would be enclosed by chain link fencing.

In-plant power distribution would be 4.16 kV to the north and south substations. Each of these substations would have two outdoor 1000 KVA transformers with 480-volt switchgear housed in concrete rooms. Motors would use 480 volts and lighting would use 120 volts. Power supply to the ball mill motors would be direct from the primary substation at 4.16 kV. Overhead power at 4.16 kV would be supplied to the pumps at the tailings pond. Two 500-kilowatt standby diesel generators would provide emergency power to critical areas in case of a power outage. These generators are expected to operate fewer than 50 hours annually.

1.2.6 Water Supply

Estimated water requirements for the Paradise Peak Project would be approximately 1,000 gallons per minute (gpm). The applicant is currently assessing groundwater availability within a 10-mile radius of the mine site. As described later in this chapter in Section 1.3.3, three possible wellfield development areas have been identified (Figure 1-2). Groundwater wells would be developed offsite and water would be piped to the mine site.

The water supply pipeline would be constructed of wrapped and coated 10-inch diameter carbon steel pipe. The pipeline would be laid in a 2-foot wide by 5-foot deep trench excavated by backhoe. The pipeline would be placed on an 8-inch bed of sand for protection. A layer of sand would also be placed over the pipeline and the remainder of the trench backfilled with excavated earth. The pipeline right-of-way would be revegetated according to BLM stipulations.

Access to the water well would be by an existing or new dirt road, depending on the alternative. Electrical supply would be provided through either an underground or overhead electric distribution line.

1.2.7 Roads

Primary access to the mine/mill complex would be from Nevada State Highway 361, via County Road 89, locally known as the Poleline Road. The county road is gravel and generally in good condition but may require some nominal realignment. Roads within the site consist of a paved access road from County Road 89, gravel haul roads to and within the mine, a gravel access road to the tailings pond, a dirt road to the water wells, and various plant roads and maintenance roadways (Figures 1-3 and 1-5).

1.2.8 Sewage and Sanitary Waste Disposal

The process plant would be equipped with a 5,000-gpd capacity sewage treatment system. All sewage would be collected from discharge points within the plant area and piped to an approved on-site sewage treatment plant. This treatment plant would screen the sewage solids, provide extended aeration of the sewage for a period of 24 hours, followed by final clarification of the treated sewage and chlorination of the effluent. It would also provide for concentration and positive recycle of the sludge. The degree of treatment would be a minimum of 90 percent removal of the BOD and suspended solids. The chlorinated effluents would be discharged into the tailings pond where it would be diluted with the tailings stream.

Solid waste would be disposed of in a sanitary landfill located within a 15-acre area immediately east of the run of mine ore stockpile. Approximately 12 trenches 300 feet long, 15 feet wide and 10 feet deep would be used over the project life. The landfill would be used for trash and other debris generated by workers and certain mining activites. Used tires would be removed as salvage and chemical reagent containers would be recycled. Used oil would be contained in a tank behind the maintenance shop and sold to a recycler. Any other toxic or hazardous wastes (e.g., paint cans) would be removed from the site for disposal at an existing approved site. An application for a permit to operate the solid waste system has been submitted to NDEP.

1.2.9 Resource Protection and Pollution Controls

FMC has included various measures in its plan of operations to protect existing resource values in the mine vicinity and to prevent undue and unnecessary degradation of air, water, and land quality during operations. These measures are summarized in the following paragraphs.

Mineral Resource Values. FMC has conducted exploration activities since 1982 to define the area and volume of the ore body. Condemnation drilling programs have been completed at waste dump, process plant, and tailings impoundment sites to assure that proposed locations do not contain recoverable minerals. Additionally, the proposed mine plan includes segregation of waste rock and low grade ore to allow future processing of the low grade ore if economic conditions warrant.

Fugitive Dust Control. Surface mining operations and other miscellaneous activities at the Paradise Peak Project would generate fugitive dust emissions. The most important fugitive dust source would be waste/ore removal and loading at the mine, waste/ore hauling, and wind erosion from waste areas and the mine. Water or chemical dust suppression would be the primary means of dust control. Other dust control techniques would include vehicle speed control on haul, access, and in-plant roads; use of coarse gravel on roadways; and stabilization of inactive wastes and storage areas.

Air Pollutant Emissions. Air pollutant emissions and their control were specifically considered by FMC in project design. Estimated emission levels, control procedures, and impacts are detailed in a separate environmental evaluation submitted to the Nevada Division of Environmental Protection, Air Quality Section. The Paradise Peak Project would result in particulate, mercury, and other air pollutant emissions during operations. Air pollutant emissions would be controlled using scrubbers, baghouses, and water spray systems. Emission levels and pollutant concentrations would meet the stipulations of the Registration Certificate of the Nevada Division of Environmental Protection and all applicable state and federal regulations.

Mercury emissions would be strictly controlled by the design of the retorting and smelting process. In addition, FMC would implement worker safety procedures for all employees working in areas where mercury vapors may occur. Workers would be required to wear masks at all times when exposure to mercury vapors is possible.

Control of Groundwater Discharges. The mill and processing facility for the Paradise Peak Project would involve the use and disposal of liquids containing sodium cyanide and other potentially harmful chemicals. The mill and tailings facility would be a closed loop system designed to prevent discharges to surface or groundwaters. Accidental releases of liquid reagents and processing solutions would be controlled within the processing facilities through proper handling and the use of collection systems designed in the facility. All reagent and liquid phase processing areas would be constructed with a bermed concrete foundation and a collection system designed to route accidental spills to a lined sedimentation pond and then back into the mill process stream.

The tailings dam and impoundment were designed to contain the tailings liquids. They would require a Water Pollution Control Permit from the Nevada Division of Environmental Protection. As described earlier, the impoundment would be lined to limit seepage. Groundwater monitoring wells would be installed downstream of the impoundment for detection of seepage.

The groundwater monitoring and recovery system is conceptual at this time and subject to the provisions of the Water Pollution Control Permit. The conceptual system would involve monitoring water levels and water quality in deep saturated volcanic bedrock and shallow unsaturated alluvium. Monitoring wells would be constructed to serve as pump back wells in the event of groundwater contamination.

Reclamation. FMC has committed to reclaiming the mine and mill facilities sites to meet the standards of BLM's surface management regulations. Specific reclamation approaches are evaluated as Alternatives within the EA (Section 1.3.2). FMC and BLM would develop a specific reclamation approach to amend to the Plan of Operations, based on the analyses conducted for the EA.

Cultural Resource Protection. A cultural resource inventory, evaluation, and mitigation program was completed within the project area of concern as part of the EA process. Cultural resources located within the area of concern would be protected from disturbance, or disturbance impacts would be mitigated prior to construction, to meet the requirements of the National Historic Preservation Act of 1966, the Guidelines and Procedures of the Advisory Council on Historic Preservation, and related regulations protecting important cultural resources. Cultural resource protection plans would be implemented in consultation with BLM and the Nevada State Historic Preservation Officer.

Wildlife Protection. FMC has incorporated several design considerations to limit potential impacts to wildlife. All above ground electric power distribution and transmission lines would be designed to limit raptor electrocution. Additionally, the tailings impoundment and other areas potentially hazardous to wildlife would be fenced to limit wildlife and livestock access.

1.3 Alternatives to the Proposed Project

Based on the results of the EA scoping process (see Chapter 4 of the EA), preliminary reviews of FMC's proposed Plan of Operations, and FMC's engineering studies, four different types of alternatives were selected for consideration in the EA: 1) the No Action Alternative, 2) a Land Sale Alternative, 3) Water Supply Alternatives, and 4) Reclamation Alternatives. These alternatives provide BLM and FMC with flexibility in developing a final Plan of Operations. These alternatives are described in following sections.

1.3.1 No Action Alternative

Under the No Action Alternative, no mining would be allowed. The No Action Alternative is required by NEPA; however, it would pose a conflict with regulations (43 CFR 3809) governing BLM management of surface land under the general mining laws. According to these regulations, FMC has the legal right to extract and process the mineral

resources it has claimed. BLM's responsibility is to assure that appropriate state and federal laws, such as the Endangered Species Act or the National Historic Preservation Act, are complied with and that the mining plan would not result in undue or unnecessary degradation of federal lands. Thus, BLM could disallow the mining activities only if the proposed operations would violate one or more of the applicable standards and must specify changes in the proposed plan of operations needed to meet the requirements of the mining regulations.

1.3.2 Land Sale Alternative

The Land Sale Alternative concerns the future land status of FMC's claim block. Currently, the lands in question are unpatented mining claims for which BLM has surface management responsibility. The EA considers the alternative that FMC would purchase the land required for all project facilities except the ore body. Such a purchase would be conducted according to the regulations of the Federal Land Policy and Management Act (FLPMA). Excluding mine pit development, 312 acres of non-mineralized land would be disturbed by the project. FMC estimates that 640 acres would be purchased from BLM to enclose all disturbances, adjacent areas, and buffer zones that may be affected by the proposed operation. The Land Sale Alternative would require a separate application from FMC and additional environmental analyses.

1.3.3 Water Supply Sources

As previously mentioned, FMC is currently assessing groundwater availability within a 10-mile radius of the mine site. Three possible wellfield development areas have been identified: the South Wellfield area, the Graben area, and the Kelly Wells area (Figure 1-2). The EA evaluates the effects of developing water supply wells in each of these locations and constructing a water supply pipeline to the mine site. Pipeline lengths would be about 2.9 miles for the South Wellfield area, 4.2 miles for the Graben area, and 4.8 miles for the Kelly Wells area. BLM has identified the South Wellfield area as its preferred water supply alternative.

1.3.4 Reclamation Alternatives

BLM regulations require FMC to specify what measures will be used to reclaim areas disturbed by mining activities. FMC has indicated its commitment to reclaim the mine and mill area according to the requirements of the BLM regulations. FMC chose to use the EA process to aid the evaluation of reclamation feasibility at the site. The EA evaluates a range of reclamation alternatives included in FMC's Plan of Operations to aid BLM and FMC in developing specific reclamation measures for the Paradise Peak Project. Three reclamation alternatives are analyzed in the EA. They encompass a range of possible approaches for meeting the requirements of the BLM regulations to provide for public safety and prevent undue and unnecessary degradation of public lands.

Reclamation Alternative A represents a low level of reclamation. Under this option, all surface facilities would be removed after mining ceases. Foundations would be left in place, however any hazards (such as exposed steel rebar) would be removed. Onsite roads would be ripped to relieve compaction. Steep slopes of the mine pit and waste dumps would be contoured with safety benches, as necessary, to assure slope stability. The tailings impoundment area would be covered with crushed rock to stablilize the tailings and to reduce wind erosion hazard. No seeding of disturbed areas would be undertaken with this option; revegetation would rely on natural invasion.

Reclamation Alternative B represents a mid-level of effort for reclamation. It includes the measures described above for the plant, mine pit, waste rock disposal areas, and roads. In addition, suitable topsoil materials would be salvaged for future reapplication to the tailings impoundment. Soil materials would be salvaged from the impoundment area or another disturbance area (such as the plant site), depending on construction needs. Following mining, the tailings impoundment area would be covered with crushed rock to isolate the tailings. It would then be resoiled and revegetated by seeding of adapted grasses and shrubs.

Reclamation Alternative C represents the highest level of reclamation effort. Under this alternative, suitable topsoil materials would be salvaged from all disturbed areas, except the mine pit area,

and stockpiled for future reapplication. Following mining all buildings would be removed. In contrast to Alternatives A and B, foundations would be removed. Onsite roads would be ripped to relieve compaction. Steep slopes of the mine pit and waste dumps would be contoured to assure slope stability. The tailings impoundment would be covered with crushed rock to stabilize the tailings. Revegetation would be attempted on all disturbance areas except the mine pit and tailings dam face. Topsoil would be placed on all disturbance areas, which would then be seeded with adapted grasses and shrubs.

BLM has identifed Reclamation Alternative B as the agency preferred alternative.

1.4 Alternatives Eliminated From Detailed Consideration

Several alternatives were evaluated by FMC during preparation of the proposed Plan of Operations for the Paradise Peak Project and determined to be unreasonable in the sense that they posed greater adverse effects on the environment or were technically or economically infeasible. These alternatives were eliminated from detailed consideration in the EA because they would not meet the objectives of the proposed action. These alternatives are described in the following sections.

1.4.1 Ore Processing Alternatives

FMC initially evaluated three methods of ore processing: 1) heap leaching; 2) grinding, agitated leach, and countercurrent decantation (Proposed Project); and 3) grinding, agitated leach, and filtration. A tradeoff study was completed by Davy McKee Corporation for the three options. The study showed that each of the three options would require nearly the same area of land. The heap leaching operation would have had the lowest resource recovery rate. The other two options would have had similar resource recovery rates; however, the filtration operation would have had higher capital costs and operating expenses. Thus, the proposed method of grinding, agitated leach, and countercurrent decantation was selected to optimize both resource recovery rates and project economics.

1.4.2 Tailings Disposal Alternatives

FMC also investigated alternative tailings disposal systems and tailings disposal sites. The alternative disposal system would have involved drying and stacking the tails with mine waste rock in a method of co-disposal. FMC evaluated the alternative from geotechnical, engineering, and economic perspectives. Although the method appeared to be technically feasible, it was determined to be economically inviable considering that the method has not been used before and proven in the mining industry, that it would pose special engineering problems, and that a conventional tailings disposal systems appeared adequate to protect groundwater resources.

Three alternative conventional tailings disposal sites were evaluated early in the design process. Each of the three sites was located within the "area of concern" identified for the project. The proposed site was selected based on geotechnical investigations (Harding Lawson Associates 1984a) that indicated it to be more suitable in terms of natural topography, availability of construction materials within the impoundment area, size of tailings dam required, and geologic conditions that would limit seepage of tailings liquids.

1.4.3 Plant Facilities Layout

FMC evaluated various location alternatives for the process plant, access road, and waste dumps. The plant and waste dump sites were selected because of their proximity to the mine. The proposed sites reduced the length of the haul road required to transport ore and waste rock from the mine. Other locations would not have significantly different environmental impacts so the locations that minimized surface disturbance and hauling distance were selected. The access road was also chosen to provide the most direct access from the existing Poleline road to the plant site.

1.4.4 Transmission Line Corridors

Three additional transmission line corridors were investigated by Sierra Pacific Power Company before the proposed alignment was proposed. One alternative was to supply permanent power from the existing

transmission line located 1.5 miles from the mine site. This alternative was rejected as technically infeasible because the existing line does not have sufficient capacity to supply the operations needs of the mine and processing plant. Two additional alternatives explored corridor locations from the Luning vicinity. One of these was rejected because it would have been located too close to the existing telephone line along Highway 361 and would have caused unacceptable interference. The other route would have traversed very rough terrain, requiring greater construction disturbance.

2.0 AFFECTED ENVIRONMENT

This EA analyzes the environment that would be affected by the Paradise Peak Project. Information summarized in this chapter was obtained from published sources; unpublished materials obtained in interviews with local, state, and federal agencies; and from reconnaissance surveys of the proposed project location. The study area varies with different resources. For some resources such as vegetation and soils, the affected area was confined to the immediate "area of concern" of the mine site (Figure 1-2) and the ancillary facilities. For other resources, such as air resources and socioeconomics, a regional study area was delineated; these resources treated the affected environment in a regional context.

For some resources, individual technical memoranda were prepared to support baseline descriptions and/or impact analyses. These resources included:

- Air Resources
- Surface Hydrology
- Soils
- Reclamation
- Vegetation
- Wildlife
- Socioeconomics

These technical memoranda are considered appendices to the EA. They are on file at the BLM Tonopah Resource Area Office and are available to the public upon request.

2.1 Air Resources

Baseline meteorology, air quality, and dispersion conditions at the Paradise Peak Project site were estimated from limited on-site data and extensive data records from monitoring stations in central Nevada (Tonopah, Hawthorne, Austin, and Fallon). Additional site-specific data are being collected according to the requirements of the Nevada Division of Environmental Protection.

2.1.1 Temperature and Precipitation

Table 2-1 presents summaries of temperature and precipitation data from four sites surrounding the Paradise Peak Project site: Hawthorne (47 miles southwest), Fallon (65 miles northwest), Austin (60 miles northeast), and Tonopah (60 miles southeast). Tonopah, closest in elevation to the Paradise Peak site, probably is the most representative estimate of on-site temperature and precipitation data.

Temperature data indicate relatively wide diurnal and seasonal variability which is typical of dry climates such as Nevada. Warmest temperatures are in July with coldest temperatures in January. Extremes can range from 110°F in the summer to -15°F in the winter.

Precipitation in Nevada is relatively sparse, averaging only about 5 inches annually. Precipitation at Austin, which is located along a west-facing mountain slope, is not considered representative of the Paradise Peak region. Monthly variability in precipitation amounts is not substantial; however, slight maximums are observed during April and May, with slight minimums in July and August.

2.1.2 Winds

Figure 2-1 illustrates a windrose for Tonopah from the period 1973-77. These data indicate that over 50 percent of the winds come from the sectors west-northwest through north, with almost 17 percent from the north sector alone. The data also indicate a secondary maximum from the south of about 8 percent. Average wind speed is 7.7 knots, with 36 percent of the observations in the 7 to 10 knot range. Westerly and southerly winds are generally strongest, averaging over 10 knots, with east and northeast winds the weakest, averaging about 7 knots.

The Paradise Peak Project would be located in complex terrain where winds are likely to be strongly affected by topographic influences. However, the primary orientation of the topography near the project site is north-south, similar to the orientation of the Tonopah airport. This indicates the Tonopah wind data probably represent a reasonable estimate of the on-site wind field.

TABLE 2-1

REGIONAL TEMPERATURE AND PRECIPITATION DATA

Station	Elevation in feet	Years of Record	Period of Record		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum, Minimum, and Mean Temperatures (F°)																	
Tonopah	5,426	33	1936-1968	Max	65	68	77	83	94	102	104	100	96	87	73	70	104
				Min	-15	-7	6	9	18	26	40	31	23	15	2	-13	-15
				Mean	30.1	34.7	39.8	48.7	56.8	63.3	73.9	71.8	64.3	52.9	38.8	33.5	50.7
Hawthorne	4,186	30	1941-1970	Max	75	78	85	92	103	107	109	110	104	95	81	73	110
				Min	-6	1	7	15	24	31	36	41	26	17	8	-2	-6
				Mean	34.9	39.8	44.3	52.0	60.2	68.3	77.0	74.6	65.5	58.6	43.9	42.0	55.1
Austin	6,543	33	1936-1968	Max	65	67	74	80	88	97	102	98	97	86	74	67	102
				Min	-15	-13	-3	3	12	25	38	30	18	13	-5	-7	-15
				Mean	27.2	31.1	35.3	43.3	51.3	59.6	70.0	68.3	60.6	50.1	37.9	32.2	47.2
Fallon	3,965	23	1951-1973	Max	70	74	84	89	97	106	107	105	98	91	80	69	107
				Min	-12	-2	1	16	20	27	38	33	23	12	4	-14	-14
				Mean	32.9	38.3	42.7	49.5	58.1	66.1	73.6	71.2	62.9	52.1	40.9	33.2	51.8
Mean Monthly Precipitation (Total Inches)																	
Tonopah	5,426	33	1936-1968	0.31	0.37	0.55	0.58	0.47	0.24	0.43	0.33	0.40	0.47	0.45	0.37	5.08	
Hawthorne	4,186	30	1941-1970	0.39	0.43	0.39	0.41	0.62	0.49	0.31	0.19	0.30	0.31	0.42	0.32	4.73	
Austin	6,543	33	1936-1968	1.06	1.12	1.51	1.49	1.33	1.13	0.56	0.51	0.47	1.07	0.93	1.08	12.12	
Fallon	3,965	23	1951-1973	0.43	0.51	0.38	0.39	0.69	0.56	0.16	0.25	0.28	0.30	0.40	0.38	4.74	

Data Source: National Climatic Center, Asheville, NC

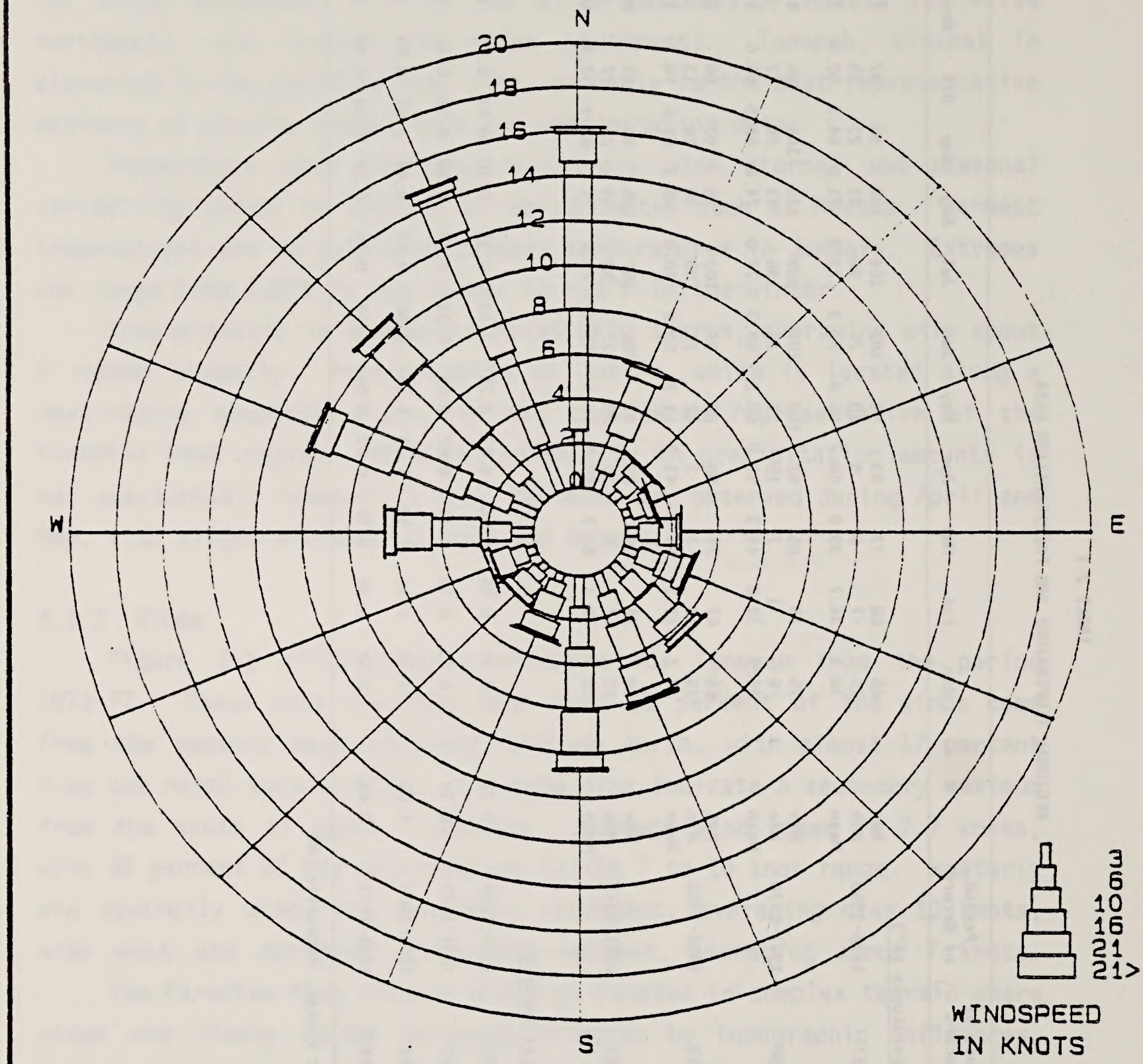


Figure 2-1
Star Windrose For Tonopah, Nevada
(1973-1977) All Stabilities

Source: ERT 1984

2.1.3 Dispersion Conditions

Dispersion conditions at Paradise Peak are affected by two parameters: stability and mixing depth. Stability defines the ability of the atmosphere to disperse a given pollutant concentration. Unstable conditions represent maximum dispersion while stable conditions represent minimum dispersion. Mixing depth defines the atmospheric volume through which dispersion may take place.

Estimates of atmospheric stability taken from the 1973-1977 Tonopah data indicate about 24 percent of the observations are associated with unstable conditions, 35 percent with neutral, and 42 percent with stable. Average wind speeds are highest for neutral conditions and decrease as the stability and/or instability increases. In general, southerly winds are associated with unstable conditions while northerly winds are associated with stable flow. Neutral conditions are often associated with strong westerly winds. Mixing depths are at a maximum during the afternoon and during summer when solar insolation is strongest.

2.1.4 Air Quality

The proposed Paradise Peak plant site is in a rural area where existing air pollutant concentrations are fairly low. The area has been designated as attainment or unclassified for all criteria pollutants and PSD Class II. Table 2-2 summarizes particulate matter (PM) concentrations measured since 1979 by the Nevada Division of Environmental Protection (NDEP) at Gabbs. Over the last five years, the maximum annual geometric mean at Gabbs was 42 $\mu g/m^3$ in 1979. The maximum 24-hour average in that period was 312 $\mu g/m^3$ measured in 1980. Concentrations have been observed in excess of the primary federal PM standard once in the last five years, and in excess of the Nevada PM standard four times in the last five years. However, since one exceedance per year is permitted, only 1980 was in actual violation of any air quality standard. The Gabbs monitoring site is in proximity to a major industrial source, the 2,400-ton per day C. E. Basic Inc. magnesium oxide plant at Gabbs. Measured PM concentrations at Gabbs reflected the influence of this source.

TABLE 2-2

SUMMARY OF AMBIENT PARTICULATE CONCENTRATIONS ($\mu g/m^3$)
GABBS, NEVADA

Year	Number of Samples	Annual Geometric Mean	Maximum 24-hour Average	2nd Maximum 24-hour Average	Concentrations Exceeding Std. Federal 260 $\mu g/m^3$	Nevada 150 $\mu g/m^3$
1979	46	42	179	120	0	1
1980	54	38	312	239	1	2
1981	53	41	161	101	0	1
1982	50	26	143	81	0	0
1983	54	24	100	95	0	0

Source: Nevada Division of Environmental Protection

TABLE 2-3

SUMMARY OF AMBIENT PARTICULATE CONCENTRATIONS ($\mu g/m^3$)
NON-INDUSTRIALIZED RURAL NEVADA

Year	Site	Number of Samples	Annual Geometric Mean	Maximum 24-Hour Average	2nd Maximum 24-Hour Average
1983	Lehman Caves	54	7	67	28
1983	Lander Co. Airport	13	14	43	40

Source: Nevada Division of Environmental Protection

Existing PM concentrations at the Paradise Peak site are expected to be considerably lower than those measured at Gabbs. The extent to which on-site concentrations are lower than at Gabbs is not currently known (although an on-site particulate monitoring program is currently in place). However, a reasonable estimate of on-site PM can be obtained from particulate measurement sites at other non-industrial settings in Nevada. Two such sites are operated by the NDEP; one at Lehman Caves National Monument in eastern Nevada (near Ely), and the other at the Lander County Airport south of Battle Mountain. The 1983 PM measures at these two sites are summarized in Table 2-3. For the purposes of the analyses, background PM concentrations at Paradise Peak are estimated to be 14 $\mu g/m^3$ for the annual geometric mean and 40 $\mu g/m^3$ for the 24-hour average. These values represent the highest annual and second highest 24-hour average particulate measurements observed during 1983 for rural non-industrialized sites in Nevada.

2.2 Geology and Mineral Resources

2.2.1 Geologic Setting

The Paradise Peak Project site is located approximately 8 miles south of Gabbs, Nevada within the Basin and Range physiographic province. Geologically, this province is characterized by isolated erosional remnants of fault block mountain ranges which are separated by aggraded desert plains. The site is bounded on the east by the northeast-trending Paradise Range and on the south and west by the northwest-trending Gabbs Valley Range. Rocks of the Gabbs Valley Range include primarily Tertiary volcanic flows and tuffs with isolated blocks of contorted and metamorphosed sediment and volcanic rocks of Permian or Triassic age. The Paradise Range consists of Permian-Jurassic age contorted and locally metamorphosed sediments, intruded by Mesozoic and Tertiary igneous rocks, and flanked with Tertiary volcanic flows and tuffs.

Valley fill sediments include Quaternary and Tertiary age gravel, sand, and silt deposited by streams, slope wash, wind, and lakes. Thickness of these deposits varies from a thin veneer on pediment slopes to probably over 1,000 feet towards the center of larger valleys.

The project site is underlain by Tertiary volcanic bedrock and thin surfical deposits consisting of pediment gravels and residual soils. The greatest thickness of valley fill sediment occurs beneath the tailings dam where these deposits are 19 feet thick (Harding Lawson Associates 1984c).

2.2.2 Geologic Hazards

Potential geologic hazards at the site were evaluated based upon literature review, aerial photograph interpretation, preliminary geotechnical investigations and a brief site reconnaissance. Geotechnical investigations conducted for FMC include four studies by Harding Lawson Associates (1984a, 1984b, 1983c, 1984d, and 1984e). The primary geologic hazard identified is ground shaking and surface liquifaction associated with earthquakes. Other hazards evaluated include unstable soils and mass-wasting processes.

West-central Nevada is historically affected by earthquakes (von Hake 1974) and is ranked in the highest class of risk (Zone 4) by the Uniform Building Code. Evidence of seismic activity near the project site includes faults mapped by Dohrenwend (1982a), Vitaliano and Callaghan (1963), and Kleinhampl and Ziony (1967). Historic fault offset has been observed within 1 mile of the site following the magnitude 7.3 Cedar Mountain earthquake of December 20, 1932 (Gianella and Callaghan 1934) and approximately 14 miles northwest of the site following the magnitude 7.1 Dixie Valley-Fairview Peak earthquake of December 16, 1954 (Slemmons 1957; Dohrenwend 1982a).

Aerial photographs show numerous lineaments which may be fault related in the vicinity of the site. Mine exploration drilling has indicated that the ore body is bounded by parallel north-trending faults (Pincock, Allen & Holt 1984). Detailed geotechnical investigations at the tailings dam site concluded that no active faults are present under the proposed embankment (Harding Lawson Associates 1984d).

Secondary seismic effects due to liquifaction of saturated sandy soils are limited by the dry climate, deep water table, and generally thin soil cover. Where deep alluvial soils occur in the basins, liquifaction could occur during seismic events if susceptible soils become saturated.

Geotechnical investigations for facility design at the site have identified isolated occurrences of expansive clay soils. These are residual soils of weathered volcanic bedrock and are typically overlain by a variable thickness of alluvial soils (Harding Lawson Associates 1984c).

Hydrocompaction of loess soils is a potential hazard in the region. The problem would be localized, occurring only where there is a relatively thick deposit of susceptible soil and water is added by some artificial means. Loess deposits commonly occur northeast (leeward) of playas and alluvial fans in the area (Dohrenwend 1982b). At the site, a 5-foot thick loess soil was identified east of the proposed tailings dam location. There are no loess deposits identified at the proposed mill site or the preferred tailings dam site (Harding Lawson Associates 1984a).

Landslides on natural slopes are uncommon in the project area. Only one landslide was identified in surficial geologic mapping of the 475-square mile Gabbs-Luning area (Dohrenwend 1981). The limiting factors are the dry climate, thin soil cover in upland areas, and general lack of clay soils. No active or potential landslides or rockfall hazards have been identified at the project site.

Erosion, deposition, rapid changes in stream course, and flash flooding on young, active alluvial fans may occasionally cause damage to roads and structures in the area. Most of the project site and facilities are located in the upper portions of drainage basins where the quantity of runoff and thus potential hazards from active fans are limited (see Surface Water Section 2.4.1). The exception is at the northeast corner of the waste rock dump area, where the drainage from a relatively large basin crosses the site.

2.2.3 Mineral Resources

Recovery of economic minerals has been an active process in the project area since the early history of Nevada. Indications of past mining activity include numerous prospects, shafts, and pits which can be found near the project site and are shown on topographic and geologic maps. Present mining activity in the project vicinity includes the C.E. Basic magnesite mine near Gabbs and numerous small gold and silver mines (typically two to three workers) concentrated in the Ione and Luning-Mina areas (Nevada Department of Industrial Relations 1983).

The Paradise Peak Project ore deposit is hosted in hydrothermally altered volcanic flows and tuffs of mid-to late-Tertiary age. Precious metal mineralization is found to some degree in each of the stratified volcanic rock units identified at the site except the basal latite unit. The majority of the economic mineralization occurs in silicified breccia and composite tuff units. In general, the higher grade precious metal mineralization corresponds to zones of higher silicification, but this is not always the case. High grade ore contains approximately 0.2 ounce of gold per ton, 12 ounces of silver per ton, and 290 parts per million of mercury. In addition to precious metal mineralization, pyrite, jarosite, iron oxides, barite, orpiment, realgar and native sulfur have also been identified.

FMC has explored the site for additional mineralization to avoid making future economic mineral reserves inaccessible. Future reserves could include extensions of the identified ore body, low-grade ore deposited as waste rock, and undiscovered ore bodies in the area. An existing inactive underground mercury mine is located within the southern portion of the proposed pit and consists of an approximately 70-foot deep shaft with several lateral drifts. There are numerous inactive mining claims in the area. These claims may be crossed by proposed alternative water pipelines and power transmission line corridors.

2.3 Paleontology

Paleontologic resources are an important geologic resource of the area. Unique occurrences of sedimentary sequences and fossils provide important keys to understanding ancient flora, fauna, geologic, and climatic conditions. A regional description of Mio-Pliocene floras of west-central Nevada is presented in Axelrod (1956).

The Union District, located approximately 16 miles northeast of the project site, contains exceptionally complete and unaltered stratigraphic sections of Paleozoic to middle Jurassic sediments. Within this District is Berlin-Ichthyosaur State Park which preserves for public display the mining ghost town of Berlin and the fossils of large marine reptiles (Silberling 1959).

Another significant paleontologic site includes the Miocene terrestrial fossils of Stewart Valley (approximately 5 miles south of the project site) preserved in lacustrine sediments (BLM 1981). This area is currently proposed by BLM to be protected as an Area of Critical Environmental Concern (ACEC).

A paleontological reconnaissance was conducted for proposed facility sites by Dr. James Firby of the University of Nevada at Reno (Firby 1984, personal communication). No paleontological resources or potentially important geological formations were identified at the mine/mill site or along any of the three alternative water pipelines. The proposed 120 kV transmission line would intersect potential fossil-bearing formations where it crosses the Stewart Valley.

2.4 Water Resources

Information presented on water resources is based on available literature and site investigations conducted for FMC. Groundwater information was supplied by Hydro-Search, Inc. (HSI) (1984a, 1984b, and 1984c) which conducted studies to develop a suitable water supply for the project and to evaluate potential groundwater impacts. Surface water investigations conducted by ERT are summarized in the Surface Water Technical Memorandum.

2.4.1 Groundwater

Regional

The proposed project is located within Gabbs Valley, a closed hydrologic basin with no perennial streams and a total drainage area of about 1,150 square miles. Groundwater recharge to this basin is estimated to be on the order of 5,000 acre-feet per year (Eakin 1962). Recharge occurs on the flanks of mountain ranges which surround and form the boundaries of the basin. Increased precipitation at higher elevations results in ephemeral streams which flow toward the basin, allowing a small percentage of precipitation to infiltrate through alluvial sediments to recharge the groundwater, while the majority of precipitation and runoff is evaporated before reaching Alkali Flat in the lowermost part of the basin.

Groundwater discharge occurs naturally in Alkali Flat and in a smaller area west of the town of Gabbs. Transpiration by phreatophytes and evaporation from soil and water surfaces account for approximately 4,000 acre-feet per year of discharge.

The most favorable aquifer unit in the Gabbs Basin is the Quaternary-Tertiary valley fill, especially near the edges of the basin. Sediments tend to be relatively coarse and well sorted near the mountain fronts, and become finer and less permeable toward the center of the basin. Additionally, groundwater quality is expected to be better nearer the recharge source, and decrease towards the basin as dissolved minerals increase due to longer time in contact with geologic materials. The total volume of groundwater stored in the porous valley fill is probably on the order of several thousand times the basin's annual recharge.

Bedrock units, including Tertiary volcanics and pre-Tertiary metasediments, generally have very low primary permeability and variable secondary permeability caused by faults and fractures. These units are not known to be developed as aquifers, probably because of low permeabilities and limited volume of aquifer storage.

The use of groundwater in the basin is limited to a significant extent by water quality. Identified uses include stock watering, irrigation, municipal, and industrial (mining). Drinking water is imported to Gabbs because of the poor quality of the town's groundwater supply. Irrigation usage is also limited by water quality and poor soil conditions. Dissolved constituents which affect usage include primarily sulfate, total dissolved solids, and locally fluoride and boron. Representative groundwater quality data are presented by Eakin (1962) and Hydro-Search, Inc. (1984a, 1984b).

Local

At the site of the proposed mine, mill, and tailings impoundment, groundwater occurs at depths of approximately 78 feet (well MS-1) to 230 feet (well TS-1) in open fractures of silicious volcanic rock of Tertiary age. Alluvial soils are thin and unsaturated near the mine site. The greatest thickness of unsaturated alluvial sediment at the site is approximately 25 feet beneath the tailings dam, and increases in thickness eastward in the unnamed valley tributary to Anton Wash.

Subsurface exploration and aquifer testing near the mine site indicate that groundwater in the volcanic rock units occurs in hydraulically separated compartments which exhibit considerable variations in permeability and static water elevation. Spatial variation in permeability is evident from differences in volumes of produced water during mineral exploration drilling and from severe boundary conditions encountered during pumping tests. Static water elevations in drill holes and completed wells show that there are segments of rock which are hydraulically separated from adjacent segments. Abrupt differences in water levels of approximately 85 feet occur locally. These segments appear to be separated by spatial variations of stratigraphy, weathering, and hydrothermal alterations; or by faults which have offset the permeable rock zones by vertical displacement. Water quality analyses from a well located east of the proposed mine pit (well MS-1) indicate that drinking water standards are exceeded for total dissolved solids (920 mg/l), iron (1.3 mg/l), manganese (0.56 mg/l), and sulfate (390 mg/l) (HSI 1984b).

Each of the three alternative well fields for the Proposed Project is located such that the Quaternary-Tertiary valley fill is expected to be of sufficient saturated thickness to serve as the target aquifer for water supply. Groundwater conditions are not well known in these alternative well field sites because, with the exception of several relatively shallow stock water wells that penetrate only the upper portion of the valley fill aquifer, there has been no extensive groundwater development in the area. Field investigations are currently being conducted by Hydro-Search, Inc. to better define groundwater conditions.

Salient characteristics for each of the well field alternatives are presented in Table 2-4. The South Wellfield area is the most favorable site in terms of pipeline distance and hydraulic lift to the point of use at the proposed mill, and water quality. A list of existing wells and groundwater rights within 3 miles of each alternative well field is presented in Table 2-5.

TABLE 2-4

COMPARISON OF WELL FIELD ALTERNATIVES

Factor	Kelly Wells Area	Graben Area	South Wellfield Area
Certainty of Supply	Good to excellent	Good to excellent	Good to excellent
Primary Reservoir	Alluvium (QTal)	Alluvium (QTal)	Alluvium (QTal)
Possible Secondary Reservoir	Paleozoic-Mesozoic (PMru), volcanics (QTv)	None	Paleozoic-Mesozoic (PMru), volcanics (QTv)
Distance from Mine	~5 miles	~5 miles	~3 miles
Pumping Lift	900-1,000 feet	1,000-1,100 feet	400-500 feet (?)
Water Rights Acquisition	Three shallow wells in area with certificated rights for 0.026 cfs. Possible private property in area.	Two unappropriated stock water wells just beyond area, along Finger Rock Wash.	One vested and one certificated water right, totaling 0.019 cfs, are located beyond the area along Antone Wash.
Water Quality	Possible elevated levels of TDS, Na, SO_4, F	Possible high levels of TDS, SO_4, and possibly others; water quality apparently substantially worse than Kelly Wells	Better than Kelly Wells and Graben areas.
Pipeline Right-of-Way	Along highway	May have to cross competing mining claims	May have to cross competing mining claims.

Source: Hydro-Search Inc. (1984a).

TABLE 2-5

EXISTING WELLS WITHIN A 3-MILE RADIUS OF THE PARADISE PEAK PROJECT ALTERNATIVE WELL FIELDS

Designation	Location[1]	Owner	Use	Water Rights Data[2]				Approx.[1] Elevation	Depth to Water (feet)	Date Measured	Water Level Elevation	Depth of Well (feet)	Water-Bearing Material[3]
				Permit	Certificate	Diversion Rate (cfs)	Annual Duty (million gallons/yr)						
Graben Area													
Finger Rock Well No. 2	10/35-3	BLM	Stock Water	None	None	None	None	4,640	119	02/29/84	4,521	170	QTal
Stinson Well	10/35-19	Stinson Ranch	Domestic	na[4]	na	na	na	4,775	183	02/28/84	4,592	265	QTal
South Wellfield Area													
Granny Goose Well	10/36-27	Yomba Shoshone Tribe	Stock Water		01458	Vested Right for 200 Head		5,170	92	02/28/84	5,078	NA[5]	QTal
Indian Well	10/37-29	Yomba Shoshone Tribe	Stock Water	13186	3964	0.013	3.07	5,400	dry to 350	02/28/84	<5,050	350	QTal
Kelly Wells Area													
Kelly Well	11/36-18	Yomba Shoshone Tribe	Stock Water	11469	3065	0.016	3.77	4,570	40	02/29/84	4,530	NA	QTal?
Stock Well	11/36-18	Ellenwood Livestock	Stock Water	12066	3482	0.010	1.09	4,571	42	02/29/84	4,529	NA	QTal?
Domestic Well	11/36-18	Gruner	Domestic	na	na	na	na	4,600	72	08/84	4,528	130	QTal

Source: Hydro-Search, Inc.

[1]Estimated from USGS Topographic map (Township/Range-Section)

[2]Source of data - Hydrographic Basin Abstract for Gabbs Valley, Nevada Division of Water Resources, 8/26/83 - updated by Hydro-Search, Inc.

[3]QTv = Quaternary-Tertiary volcanics,
QTal = Quaternary Tertiary alluvium

[4]na = Not applicable

[5]NA = Not available

2.4.2 Surface Water

The Paradise Peak Project mine site and respective watersheds are located in the Gabbs Valley drainage basin near the far southeast corner of the Gabbs Valley and the western boundary of the Toiyabe National Forest. This is a closed basin with surface runoff terminating in Alkali Flat in the west-central part of the valley. Gabbs Valley trends east-west and is approximately 32 miles long and 20 miles wide. The total basin drainage area including tributary valleys is approximately 1,150 square miles. The drainage area affected by the mine site, including proposed disturbed areas and drainage areas contiguous and upstream to any disturbance, is approximately 1.6 square miles. The principal tributary valleys are Lodi Valley in the northeast part of the basin, Stewart Valley in the southwest, and the valley to the west of Gabbs Valley drained by Nugent Wash.

There is no perennial or intermittent surface water on or near the mine site. Runoff from the watershed in which the tailings area is proposed flows to the south approximately 2.8 miles via an ephemeral drainage and empties into Antone Wash. Flow in Antone Wash is to the west-southwest approximately 2.7 miles into the ephemeral Finger Rock Wash in Stewart Valley. Flow in Finger Rock Wash is to the northwest approximately 25.3 miles into Alkali Flat located at the lowest basin elevation (approximately 4,100 ft MSL) in the west-central part of Gabbs Valley. Runoff from the watershed relative to the remainder of the mine site, including the mill, ore stockpile, waste rock piles, and mine pit, is predominantly to the north-northwest 7.8 miles into Gabbs Valley and west approximately 18.2 miles to Alkali Flat via a network of ephemeral drainages.

Runoff from the project site is limited to short periods after high intensity storms or rapid snow melt. The runoff from the site reaching the Alkali Flat area of Gabbs Valley is extremely small and occurs infrequently as a result of high evaporation and infiltration rates coupled with extremely dry soil conditions prior to each rainfall occurrence (Eakin 1962, Riggs and Moore 1965). Average annual precipitation at the site is estimated to be less than 5 inches per year. Thunderstorm rainfall amounts are low relative to most thunderstorm-prone areas in the United States, with a 100-year, 6-hour

rainfall amount of only 1.55 inches (Table 2-6). An evaluation to estimate the mean annual runoff from the ungaged mine-site watersheds (Riggs and Moore 1965) indicated a surface water yield of zero inches per year.

2.5 Soils

Since no soil surveys of the area have been conducted by federal or state agencies, ERT soils personnel conducted soil mapping and sampling efforts at the site in mid-July 1984. The results of this field work are summarized in the EA. The soils of the project area of concern are mapped on Figure 2-2. More information on the soils of the study area is contained in the Soils Technical Memorandum.

The Paradise Peak project area lies in the Great Basin section of the Basin and Range Province (Peterson 1981). The region is characterized by broad, alluvium-filled basins bounded by high, steep mountain ranges. Smaller, isolated mountains and hills are not uncommon. Extrusive igneous bedrock is dominant, with hydrothermally-altered zones and sedimentary rocks occurring in some areas. This geologic pattern generally results in shallow rocky soils on steep ridge crests. Progressively deeper and more finely-textured and sorted soil materials occur downward from the colluvial sideslopes to the alluvial fans and playas.

On the project area itself, the highest ridge crests are dominated by rock outcrops of andesite or similar extrusives. Steep upper hillslopes are occupied by shallow, coarse-textured rocky soils. Downslope colluvial action has resulted in deep, coarse-textured soils with strong calcium and sodium accumulations on the lower sideslopes. This toposequence occurs both in the proposed mine area and on ridges bounding the proposed tailings area. Shallow, rocky soils also occur in downslope positions along the northern edge of the proposed tailings area.

Alluvial fans occur throughout the study area in various forms and positions. In both the proposed mine area and tailings area, an undulating, slightly higher fan position is occupied by Clowfin soils. These are deep, calcareous, very gravelly sandy loams and loamy sands on proximal and mid-fan positions of valley sideslope fans.

TABLE 2-6

POINT RAINFALL AMOUNTS[1]

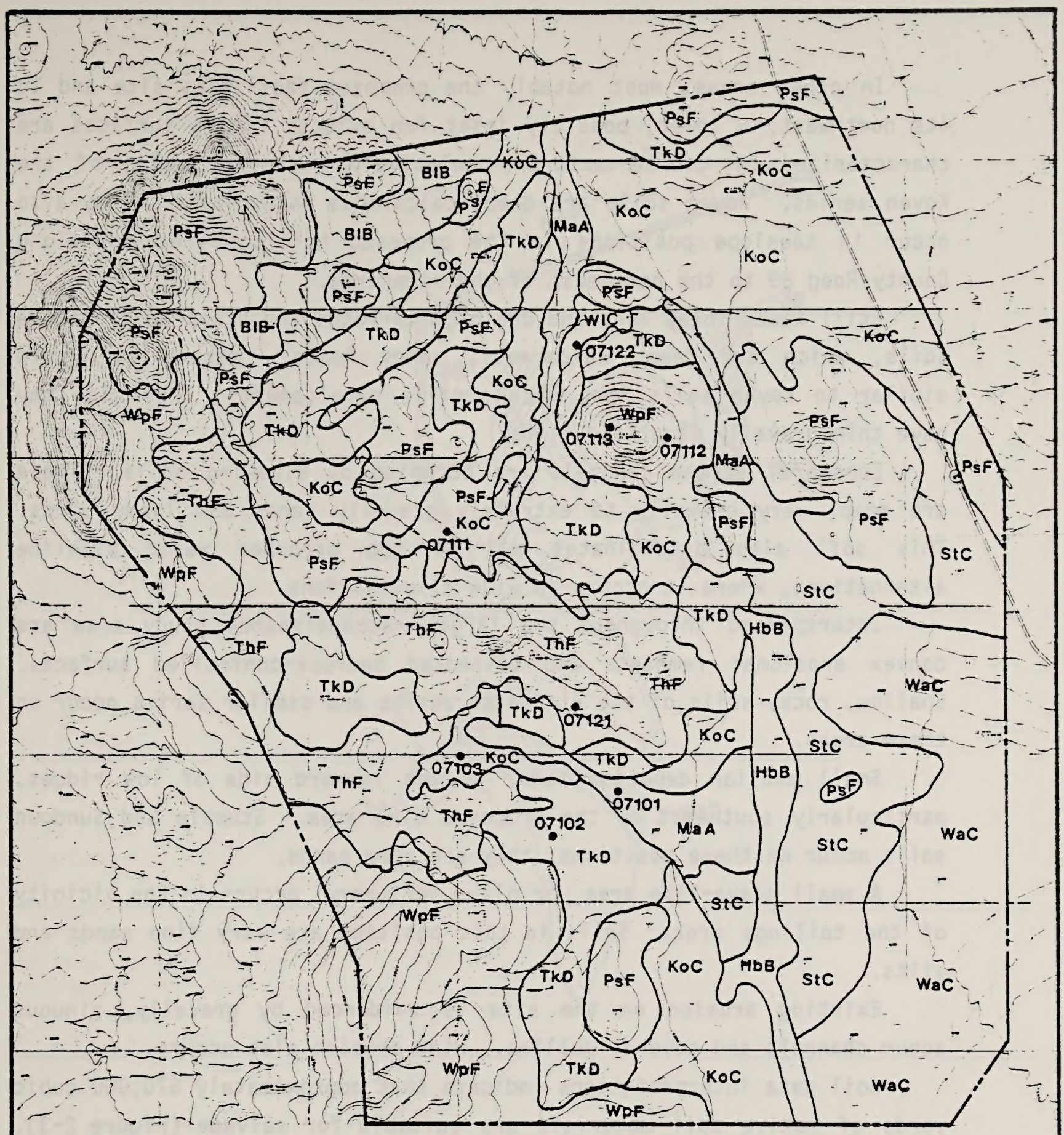
Storm Recurrence Interval (Years)	Total Storm Point Rainfall (Inches)		
	1-Hour Duration	6-Hour Duration	24-Hour Duration
2	0.24	0.65	0.95
10	0.40	1.08	1.55
25	0.48	1.28	1.90
100	0.63	1.55	2.35
PMP[2]	9.36[3]	12.19[4]	NA

[1]Paradise Peak Project point rainfall amounts for the 2-Year through 100-Year storms taken from National Oceanic and Atmospheric Administration Atlas for Nevada (NOAA 1973). PMP point rainfalls taken from HMR 49.

[2]PMP is probable maximum precipitation.

[3]Probable maximum 1-hour thunderstorm point rainfall.

[4]Probable maximum 6-hour thunderstorm point rainfall.



BlB Bluewing very gravelly loamy sand, 0 to 4 percent slopes.
HbB Hessing-Bylo variant complex, 0 to 4 percent slopes.
KoC Koyen very gravelly sandy loam, 2 to 8 percent slopes.
MaA Mazuma gravelly fine sandy loam, 0 to 4 percent slopes.
PsF Pintwater-Singatse complex, 15 to 30 percent slopes.
StC Stumble gravelly sandy loam, 0 to 8 percent slopes.
ThF Theon variant-Rock Outcrop complex, moderately steep to steep.
TkD Trocken tax. Very cobbly sandy loam, 5 to 15 percent slopes.
WaC Wardenot gravelly sandy loam, 0 to 4 percent slopes.
WlC Woolsey extremely gravelly loamy sand, 2 to 8 percent slopes.
WpF Woolsey variant-Pintwater variant association, 20 to 40 percent slopes.

Figure 2-2
Soils Map For Paradise Peak Project Study Area

In other areas, most notably the proposed facilities site and to its northwest, a lower, possibly inset fan exists. These surfaces are characterized by coarse-textured, relatively rock-free soils of the Koyen series. Koyen soils are deep, calcareous sandy loams. They also occur in toeslope positions in the proposed tailings area and along County Road 89 to the northeast of the mine area.

Still lower inset fans and drainage terraces are occupied by Mazuma soils, which are deep, calcareous, sandy loams. Mazuma soils are similar to Koyen soils, but lack profile development. They also may have thin gravelly stratifications.

Ephemeral stream channels are occupied by Bluewing soils. These are deep, very gravelly to extremely gravelly sands and loamy sands. This soil also predominates all of the proposed water pipeline alternatives, where it occurs on wide alluvial fans.

Interspersed throughout the larger reconnaissance study area are convex erosional remnants and dissected bedrock-controlled surfaces. Shallow, rocky soils of the Pintwater series and similar series occur on these areas.

Small aeolian deposits occur on the leeward side of low ridges, particularly southeast of the proposed mine area. Stumble and Sundown soils occur on these positions; they are deep sands.

A small playa-like area, or playa periphery, occurs in the vicinity of the tailings area. Soils in this position are very fine sands and silts.

Existing erosion on the site is evidenced by gravelly, sinuous scour channels and several gullies. Wind erosion also occurs.

Soil data interpretations indicate that approximately 670,000 cubic yards of native soil materials are suitable for salvage (Figure 2-3). For the most part, these materials are from the Koyen and Mazuma soils. They are characterized by coarse textures and relative low amounts of soluble salts. In general, the remaining soils in the area are too shallow, rocky, salty, or a combination of these factors, to be recommended for salvage.

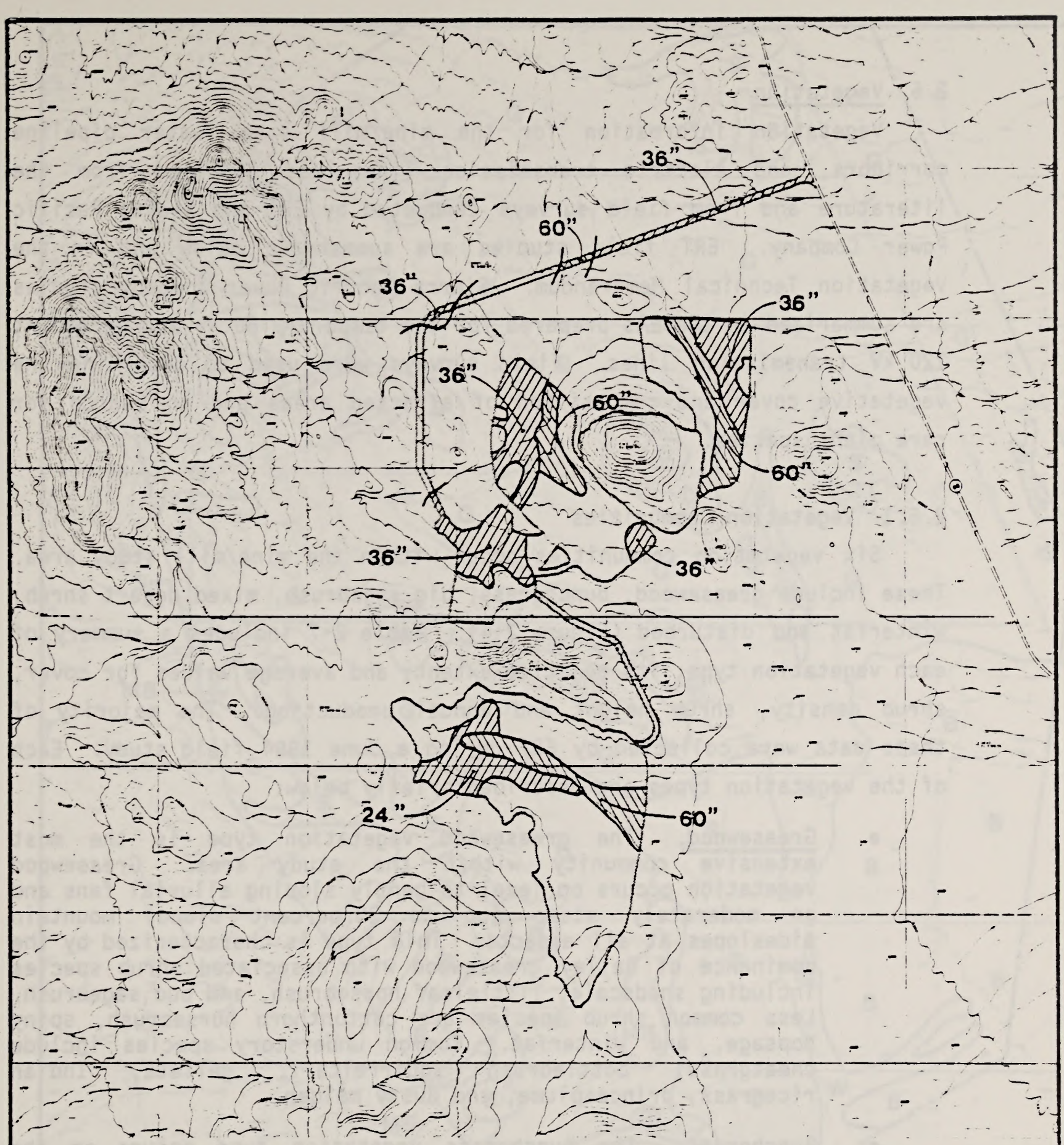


Figure 2-3
Potential Topsoil Salvage Areas And Depths
For The Paradise Peak Project Study Area

2.6 Vegetation

Vegetation information for the mine/mill site, water pipeline corridors, and electric transmission lines was obtained from the literature and from field surveys conducted by ERT and Sierra Pacific Power Company. ERT field studies are summarized below and in the Vegetation Technical Memorandum. Sierra Pacific Power Company studies are summarized in the EAs prepared for the temporary 60 kV and permanent 120 kV transmission lines. Field surveys were used to determine the vegetative cover and composition of affected areas and to search for rare plant species.

2.6.1 Vegetation Communities

Six vegetation communities occur within the mine/mill study area. These include greasewood, bunchgrass, big sagebrush, mixed desert shrub, winterfat and disturbed (Figure 2-4). Table 2-7 includes a summary of each vegetation type; its relative extent; and average values for cover, shrub density, shrub height and annual production. The majority of these data were collected by ERT during a June 1984 field study. Each of the vegetation types are described briefly below:

- Greasewood. The greasewood vegetation type is the most extensive community within the study area. Greasewood vegetation occurs on level to gently sloping alluvial fans and on moderately steep (up to 30 percent slope) mountain sideslopes at all aspects. This type is characterized by the dominance of Bailey greasewood with associated shrub species including shadscale, littleleaf horsebrush, and bud sagebrush. Less common shrub species are cottonthorn horsebrush, spiny hopsage, and winterfat. Common understory species include cheatgrass, bottlebrush squirreltail, galleta, Indian ricegrass, princesplume, and dusty maiden.

- Bunchgrass. The bunchgrass vegetation type occurs on the nearly level (0 to 2 percent) alluvial drainage areas in the southeastern portion of the study area. Isolated pockets of this community are located on steep (up to 80 percent) mountain sideslopes in association with rock outcrops. This grass-dominated community contains Indian ricegrass, bottlebrush squirreltail, cheatgrass, galleta, and needle-and-thread. Shrub species include winterfat, bud sagebrush, fourwing saltbush, and stickyleaf low rabbitbrush. Scarlet globemallow is the most common forb occurring in the bunchgrass vegetation type.

Figure 2-4
Vegetation Map Of FMC Paradise Peak Project Area

Source: ERT 1984

TABLE 2-7

VEGETATION TYPE DATA SUMMARY

Vegetation Type	Acres/Relative percent	Average Total Plant Cover Range (percent)	Average Shrub Density (shrubs/acre)	Average Shrub Height Range (cm)	Annual[1] Production (lbs air-dry/acre)
Greasewood	2,604 (68)	30 - 40	9,310	15 - 45	100-350
Bunchgrass	678 (18)	34 - 40	6,578	<20	150-400
Big Sagebrush	337 (9)	24 - 28	6,072	10 - 30	150-500
Mixed Desert Shrub	101 (3)	20 - 30	5,060	30 - 45	150-300
Winterfat	37 (1)	18 - 28	11,638	10 - 20	150-400
Disturbed	44 (1)	5 - 20	-	-	-
TOTAL	3,801				

[1]Potential production levels based on SCS range site information (SCS 1980): Greasewood - Desert Loamy Sal (4-8 inches); Bunchgrass - Desert Sand (4-6 inches) and Desert Loamy (4-6 inches); Big Sagebrush - Desert Stony Hill (4-6 inches) and Semi-Desert Loamy Slope (5-8 inches); Mixed Desert Shrub - Desert Stony Hill (4-6 inches); Winterfat - Desert Loamy (4-6 inches).

- Big Sagebrush. The big sagebrush vegetation type is found along the higher elevation ridge tops, on low hills, and on steep (up to 100 percent) mountain sideslopes. These areas are concentrated in the western and southwestern portions of the study site. This community is characterized by the dominance of big sagebrush with scattered occurrences of Bailey greasewood, Nevada ephedra, twinberry, and shadscale. Common understory species are bottlebrush squirreltail, cheatgrass, and galleta.

- Mixed Desert Shrub. The mixed desert shrub vegetation type occupies steep (up to 80 percent) mountain sideslopes. This community appears to occur as a transitional type above the lower elevation greasewood type and below the higher elevation big sagebrush type. Several shrub species clearly dominate this community. Common shrubs are twinberry, Nevada ephedra, littleleaf horsebrush, and spiny horsebrush. Less common shrubs include shadscale, bud sagebrush, big sagebrush, and Bailey greasewood. The understory is commonly comprised of grasses such as galleta, cheatgrass, Indian ricegrass, bottlebrush squirreltail, and needlegrass.

- Winterfat. The winterfat community is the least extensive type within the study area and is concentrated along the broad, gently sloping Stewart Valley drainage in the extreme southeastern corner of the mine study area. This vegetation type is strongly dominated by winterfat with less common associated species such as bud sagebrush, Indian ricegrass, bottlebrush squirreltail, cheatgrass, and shadscale.

- Disturbed. The spoil piles at the base of the mine display natural reinvasion by a limited number of species. Common plants include bottlebrush squirreltail, Indian ricegrass, cheatgrass, Russian thistle, and shadscale. Plant cover estimates range from 5 to 20 percent depending on slope and aspect.

Vegetative communities along the alternative water pipelines are similar to those of the mine/mill site. The Kelly Wells area water pipeline corridor would cross the greasewood vegetation type throughout its entire course. The South Wellfield area water pipeline corridor would intersect the greasewood and bunchgrass vegetation types. The Graben area water pipeline corridor occurs within the greasewood and big sagebrush vegetation types.

The proposed transmission line corridor from the mine area to Luning would intersect three major vegetation communities; greasewood, black sagebrush, and mixed shrub. The greasewood and black sagebrush

types generally occupy the lower elevations common throughout the majority of the route. The higher elevation, mountainous areas (e.g., Gabbs Valley Range) are dominated by the mixed shrub vegetation type. Species composition of the greasewood type is similar to that described for the mine area. The black sagebrush type is dominated by black sagebrush, stickyleaf low rabbitbrush, and Indian ricegrass. Total plant cover estimates ranged from 25 to 35 percent. The mixed shrub community is characterized by low ground cover (5 to 15 percent estimate) on steep to very steep slopes. Common species include Nevada ephedra, shadscale, littleleaf horsebrush, Indian ricegrass, and princesplume.

2.6.2 Threatened and Endangered Plants

Field surveys of the mine/mill area of concern, alternative water pipeline routes, and electric transmission line corridors were completed to determine the presence of threatened and endangered plants. No plants officially listed by the U.S. Fish and Wildlife Service or the State of Nevada were encountered during the field surveys.

One population of Asclepias eastwoodiana was located on the mine/mill site during the June field survey (Figure 2-5). The population of approximately 300 individual plants was located about 1,000 ft south of the ore body in an area proposed as a waste dump. Asclepias eastwoodiana is classified as a Category 2 candidate species for the federal threatened and endangered species list [Federal Register 45(232):82480-82569, December 15, 1980]. Category 2 plants are those that appear eligible for listing, but require further biological study. Category 2 plants are to be considered in environmental planning [Federal Register 48 (229):53640-53670, November 28, 1983]. The species is not officially listed by the State of Nevada, but is on the "watch" list developed at the 1981 Threatened and Endangered Plant Workshop. More detailed site-specific information concerning this population is included in the Rare Plant Technical Memorandum.

Asclepias eastwoodiana is known from Nye, Lander, Esmeralda, and Lincoln Counties in Nevada. As shown in Table 2-8, the plant has been recorded in at least 17 other locations.

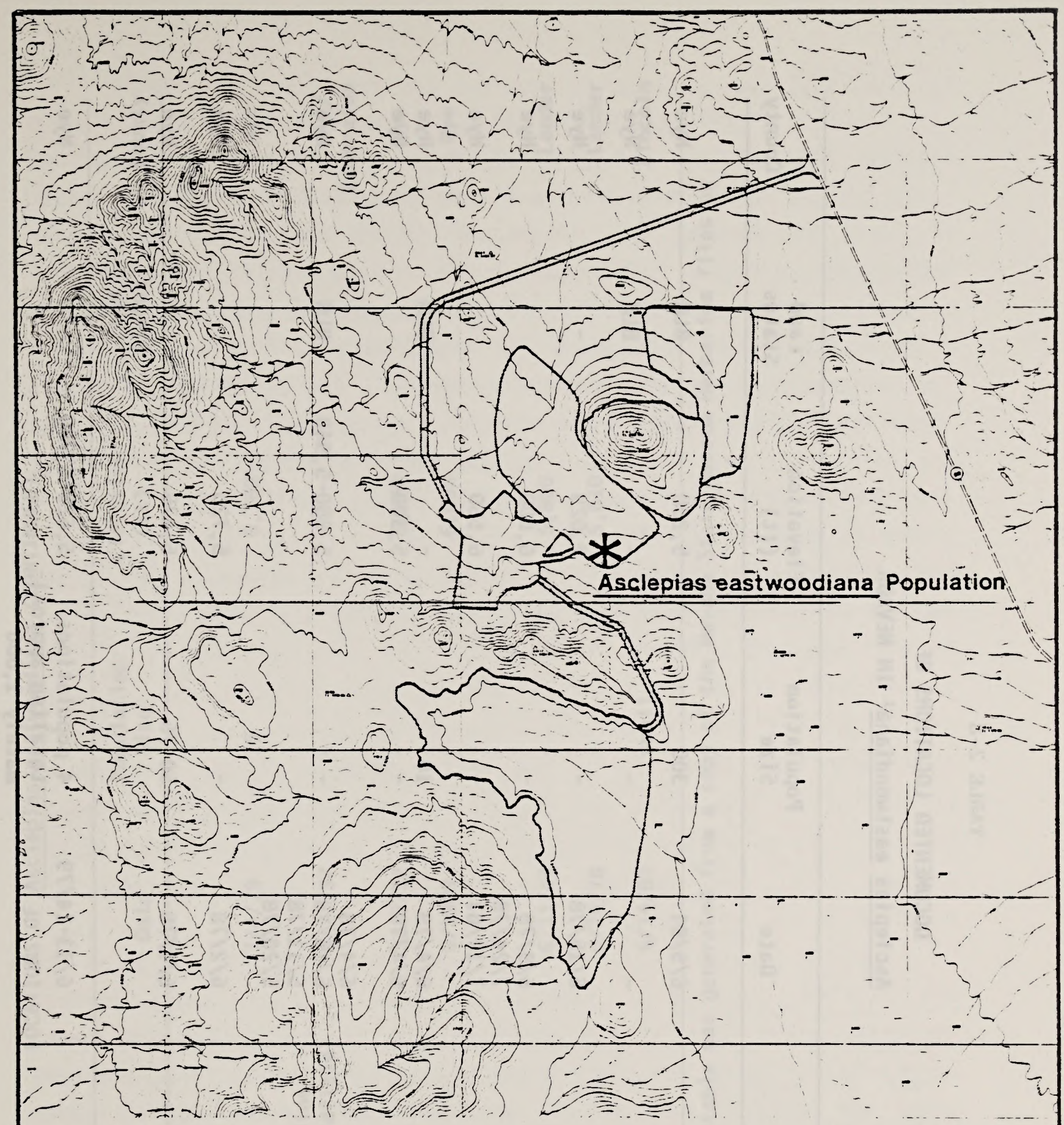


Figure 2-5
Location of Asclepias eastwoodiana Population

TABLE 2-8

DOCUMENTED LOCATIONS OF
Asclepias eastwoodiana[1] IN NEVADA

Location	Date	Population Size	Elevation (ft)	Land Status	County
T10N, R36E, Section 4 (FMC Paradise Peak Project)	6/5/84	300	5,250	BLM	Nye
T9N, R37E, Section 2, 11	-	-	-	BLM	Nye
T8N, R44E	6/15/78	-	7,029	-	Nye
T7N, R43E, Section 17	6/8/78	-	6,600		Nye
T7N, R43E, Section 8	7/24/78 7/17/81	-	6,550		Nye
T6N, R61E, Section 8	6/4/79	10	-	BLM	Nye
T6N, R61E, Section 18	6/4/79	-	5,300		Nye
T5N, R44E, Section 29, 30	6/4/78 6/15/78 5/11/78 5/20/78	-	5,880-5,940	BLM	Nye
T2S, R46E, Section 3	6/2/78	-	5,725		Nye
T1S, R46E, Section 27, 28	6/1/78	50-75	5,475		Nye
Stewart Valley Drainage (15.5 to 16 miles south - southeast of Gabbs)	6/13-14/79	4 populations totaling approximately 1,000 individuals	5,625-5,700		Nye

TABLE 2-8

LOCATIONS OF Asclepias eastwoodiana (CONTINUED)

Location	Date	Population Size	Elevation (ft)	Land Status	County
Little Fish Creek Valley (37 miles east from town of Round Mountain)	7/4/79	15	6,780		Nye
Esmeralda and Nye County line (12 miles northeast of Goldfield)	5/27/37	-	-		Nye/ Esmeralda
Twin River	5/27/32	-	6,000		Nye
Tonopah	6/1909	-	6,000		Nye
Reese River Valley (6 miles northwest of Austin)	6/11/44	-	5,800		Lander
T21N, R43E, Section 29	6/14/78	-	5,610		Lander
T1N, R64E, Section 23	6/14/81	small	-		Lincoln

[1]Information presented in table was generated from a copy of the Nevada State Museum Herbarium files on Asclepias eastwoodiana.

2.7 Wildlife

Wildlife resource information for the general region of the Paradise Peak Project was gathered from publications, file data, and interviews with personnel of the Nevada Department of Wildlife, Bureau of Land Management, U.S. Fish and Wildlife Service, and other appropriate agencies and organizations. Site-specific studies were conducted to inventory mammals, songbirds, raptors, and reptiles at the project site (see Wildlife Technical Memorandum).

As described in the vegetation section, the affected environment consists of plant communities and wildlife habitats characteristic of the cold Great Basin desert. Typical wildlife habitat in the project area can be described as open stands of low and dwarf shrubs. Trees are virtually absent, and value of the habitat is limited by its structural and compositional homogeneity. Surface water is extremely scarce and habitat value is further limited by the lack of available water on and in the immediate vicinity of the site. The Paradise Range, 5 miles to the northeast of the project site, and the Gabbs Valley Range, southwest of the project site in an area traversed by the proposed transmission line, add some diversity to the region because of the presence of pinyon-juniper vegetation and occasional rock outcrops or escarpments. Springs, such as Willow Springs approximately 2.5 miles northeast of the project site, are important to the area's wildlife diversity and critical to the survival of some species.

Typical species of the project area include mammals such as the black-tailed jackrabbit, desert cottontail, badger, and coyote; raptorial birds such as the golden eagle, prairie falcon and raven; songbirds including the black-throated sparrow, horned lark, and rock wren; and reptiles such as the sagebrush lizard, fence lizard, horned toad, and zebra-tailed lizard. As is characteristic of the Great Basin, small mammal abundance and diversity is high and the area supports species such as Ord's kangaroo rat, Great Basin pocket mouse, brush mouse, antelope ground squirrel, northern grasshopper mouse, little pocket mouse, Merriam kangaroo rat, desert wood rat, deer mouse, and sagebrush vole.

Except for occasional and sporadic use by mule deer, the site is not used as big game range. Mule deer yearlong range occurs in and adjacent to the Toiyabe National Forest of the Paradise Range, approximately 4 miles east of the project site, and in the Shoshone Mountains and Toiyabe Range, Toiyabe National Forest, approximately 20 miles east of the project site (Figure 2-6). Nevada Department of Wildlife data from aerial surveys conducted in these areas show a total count of approximately 4,300 deer in Management Area 17 (Lusk 1984, personal communication). Mule deer yearlong range also occurs adjacent to the proposed transmission line corridor in the Gabbs Valley Range both north and south of Highway 23 (Figure 2-6).

An area classified as pronghorn yearlong range occurs 51 miles southeast of the project site in the Ralston Valley (Kay 1984, personal communication). An area classified as pronghorn potential range by the Nevada Department of Wildlife, and an area where introductions of the pronghorn may occur at some undetermined future time, is located approximately 16 miles east of the project site in the Ione Valley immediately to the west on the Shoshone Mountains (Tsukamoto 1983).

The chukar is the most important gamebird in the project region. It is an exotic gamebird first introduced to Nevada in 1935 (Christensen 1970). Chukar were not observed on the project site, and the immediate area is not classified as chukar range. The Nevada Department of Wildlife has delineated the Willow Springs area, approximately 2.5 miles east of the project site, as high-density chukar range with 30 to 50 birds per square mile. The general area west of the Paradise Range, including County Road 89 access to the site, is designated as medium-density chukar range, with 15 to 30 birds per square mile. The Paradise Range itself is classified as low density chukar range supporting fewer than 15 birds per square mile (Figure 2-7). The proposed transmission line would pass through the Gabbs Valley Range in an area classified as low-density chukar range.

Raptor nest searches documented three nesting raptorial species in the area: the golden eagle, prairie falcon, and raven. An active golden eagle nest was located immediately to the west of the project site, about 1.5 miles from the ore body on a west-facing escarpment. Another golden eagle nest complex (involving three individual nests) was

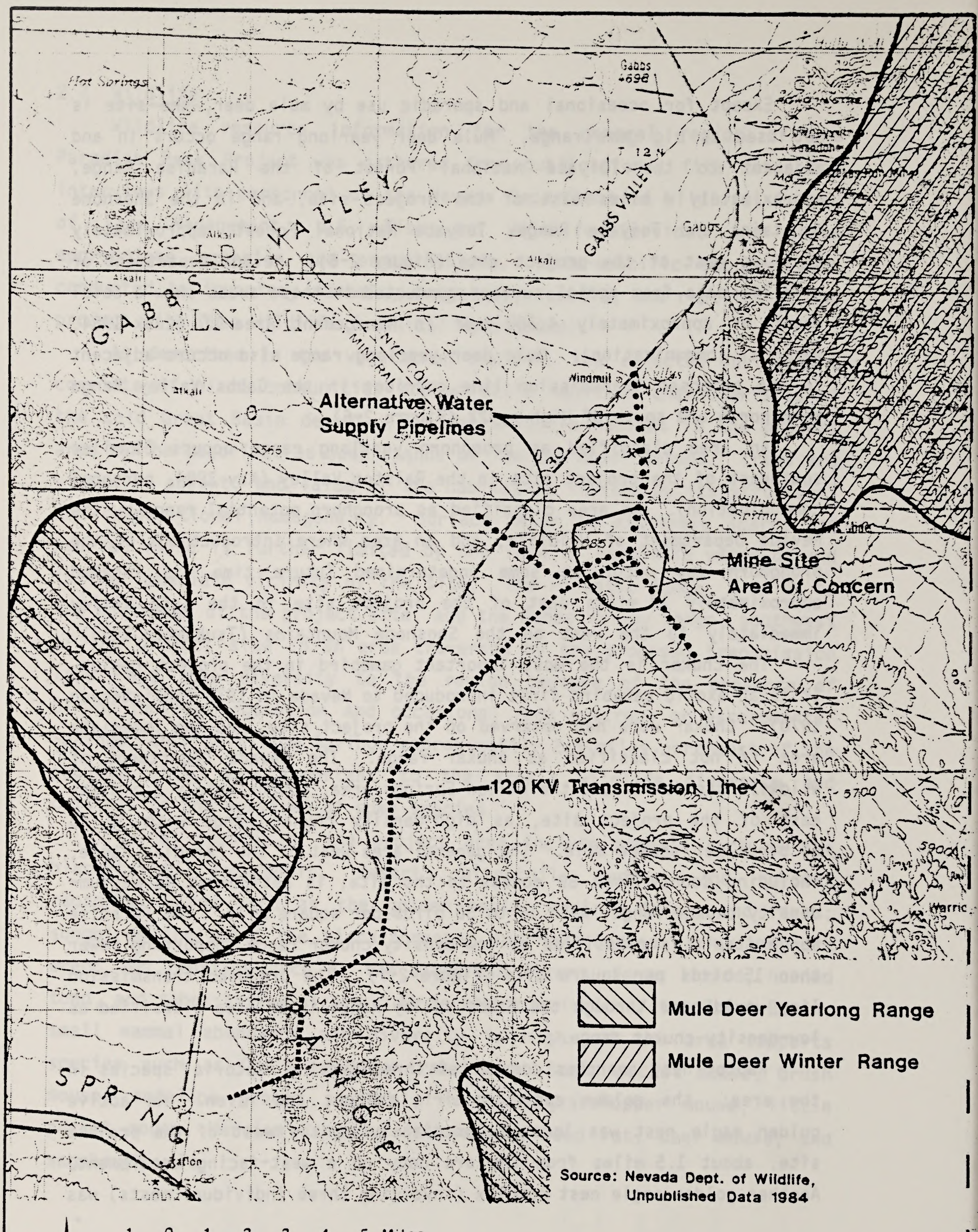


Figure 2-6
Important Mule Deer Ranges In The Paradise Peak Project Study Area

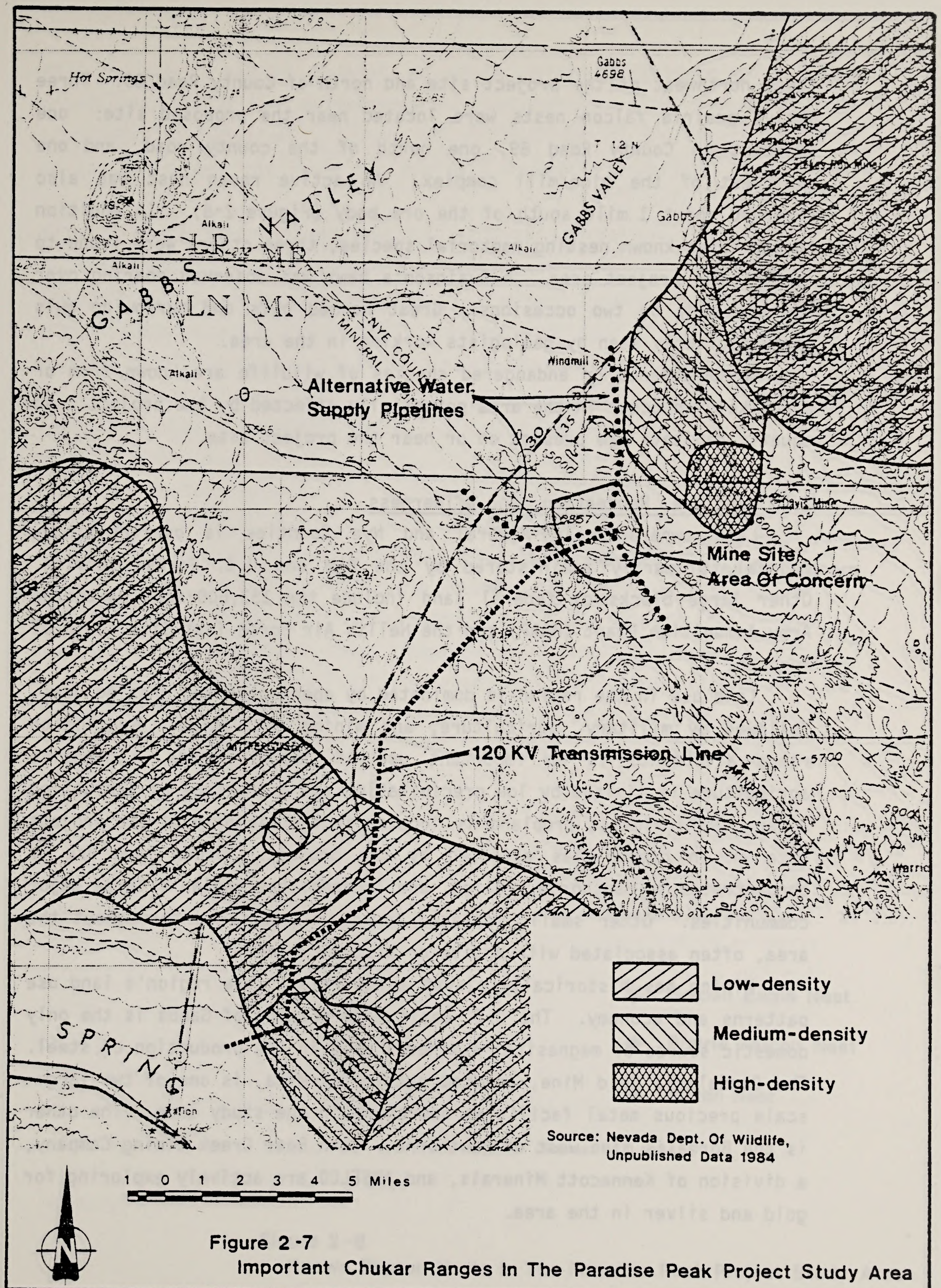


Figure 2-7
Important Chukar Ranges In The Paradise Peak Project Study Area

found northwest of the project site and north of County Road 89. Three active prairie falcon nests were located near the proposed site: one adjacent to County Road 89, one north of the county road, and one southwest of the mine/mill complex. An active raven nest was also observed about 1 mile south of the ore body (Figure 2-8). In addition to the three known nesting raptorial species, three others were found to inhabit the project area. A Swainson's hawk was observed soaring over the ore body on two occasions. Great horned owls and burrowing owls were reportedly seen by geologists working in the area.

No threatened or endangered species of wildlife are known from or are likely to occur in the area potentially affected by the project. No aquatic habitats are present on or near the project site.

2.8 Land Use, Recreation, and Wilderness

Land ownership in Mineral and Nye Counties is overwhelmingly federal, primarily administered by the BLM and U.S. Forest Service. Other large blocks of federal land include the 153,600-acre Hawthorne Army Ammunition Plant (HAAP) and the Nellis Air Force Test Site south of Tonopah.

Land use in the region is dominated by open space and grazing uses, followed by military, agriculture, and mining activities. Grazing on range allotments is an important use of federal lands. Intensive agriculture is limited by low precipitation and a shortage of irrigation water. No irrigated cropland is located in the vicinity of the project site or in communities affected by the project. Urban land use is concentrated in Hawthorne, Fallon, and Tonopah, the region's three major communities. Other small, isolated towns are scattered throughout the area, often associated with active or historic mines.

Mining has historically played a key role in the region's land use patterns and economy. The C.E. Basic Mine outside of Gabbs is the only domestic source of magnesite, a mineral used in the production of steel. The Candelaria Gold Mine, located outside of Mina, is one of two large-scale precious metal facilities operating in the study area. The other is the Borealis mine west of Hawthorne. Both Bear Creek Mining Company, a division of Kennecott Minerals, and AMSELCO are actively exploring for gold and silver in the area.

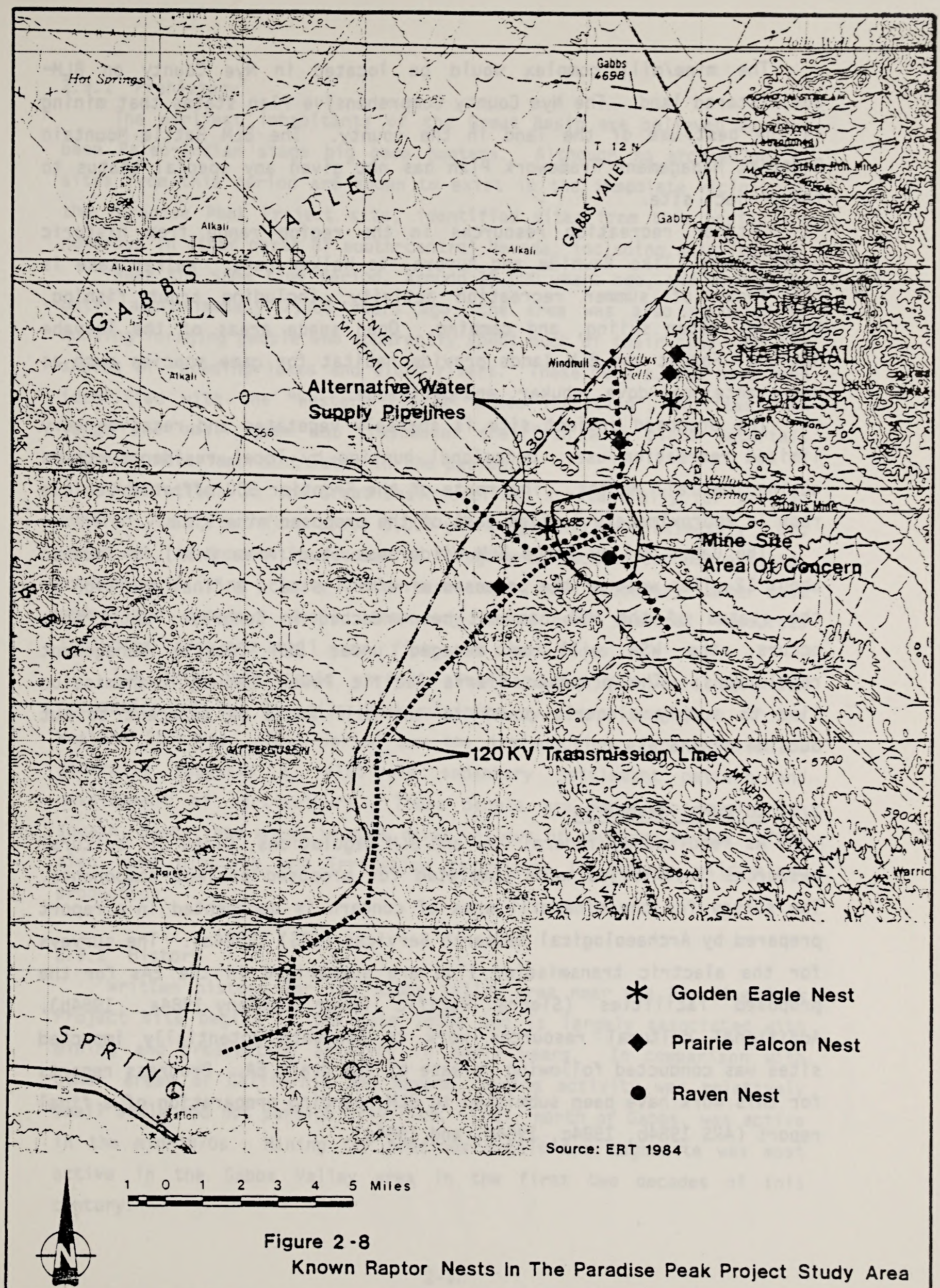


Figure 2-8
Known Raptor Nests In The Paradise Peak Project Study Area

The mine/mill complex would be located in Nye County on BLM-administered land. The Nye County Comprehensive Plan states that mining is the best use of the land in the county. The BLM Battle Mountain District Management Framework Plan has not given any special status to the project site.

Outdoor recreation resources in the region range from historic ghost towns, like Rawhide and Aurora, to Walker Lake. Walker Lake is the focus of summer recreation activity, including trout fishing, boating, water skiing, and camping. Open space areas of the Toiyabe National Forest and BLM lands provide habitat for game species such as deer, antelope, dove, chukar, and partridge.

The proposed project site is sparsely vegetated and receives very limited recreation use. Occasional hunting by local residents occurs during the fall months. The route of the Frontier 500 off-road vehicle race is approximately 3 miles east of the proposed mine site.

The Gabbs Valley Range BLM Wilderness Study Area (WSA) is located about 12 miles west of the proposed mine/mill site. A final decision on the status of the WSA has not been reached in Congress; until this occurs, the WSA will be managed under BLM Interim Management regulations. The proposed Sierra Pacific Power Company transmission line to supply electric power to the mill would be adjacent to but outside of the WSA.

2.9 Cultural Resources

As required by federal law and BLM regulations, Class III cultural resources inventories were completed for proposed project components. The survey for the mine/mill area of concern is documented in a report prepared by Archaeological Research Services (ARS) (1984a). The surveys for the electric transmission line are summarized in the EAs for the proposed facilities (Sierra Pacific Power Company 1984a, 1984b). Additional cultural resources work to evaluate potentially impacted sites was conducted following release of the draft EA. Progress reports for this work have been submitted to BLM, pending preparation of a final report (ARS 1984b, 1984c, 1984d, and 1984e).

2.9.1 Prehistory

The earliest inhabitants of the Great Basin are believed to have been Paleo-Indian stage big game hunters. Although no archaeological sites from this period are known to exist in the immediate vicinity of the Paradise Peak Project site, identified sites from this period are numerous in other parts of south-central Nevada, including near Tonopah.

Near the same time period, around 12,000 years ago, and continuing until approximately 7,000 years ago, the area was also occupied by hunting-foraging people who apparently spent much of their time near the shores of receding lakes and along rivers. These people, who have been identified with the "Western Pluvial Lakes Tradition", utilized both large and small game and freshwater shellfish with plant materials becoming more important later in the period.

Populations in the Great Basin declined substantially for several hundred years, but from about 6,000 years ago until approximately 1,000 years ago, an apparently successful foraging-collecting economy existed, probably utilizing primary winter base camps, some secondary summer base camps and numerous small, temporary camps near seasonal resources including large and small game, fish, and plant foods.

The late prehistoric period, after about 1,000 years ago, saw occupation of the Paradise Peak vicinity by direct ancestors of the Western Shoshone. This period saw the introduction of ceramics which generally suggests a relatively sedentary settlement pattern and development of horticulture. These people are known to have grown squash, beans, and wheat in some river valleys of southern Nevada. They also used planting and irrigation techniques to enhance wild plant production.

2.9.2 History

Written history for the Gabbs Valley area near the Paradise Peak Project site begins in the late 1800s and is largely associated with mining and prospecting activity in early years. In comparison with other areas of California and Nevada, mining activity was relatively small scale and not particularly rich. Lodi, north of Gabbs, was active in the mid-1870s. Mining for precious metals and magnesite was most active in the Gabbs Valley area in the first two decades of this century.

2.9.3 Archaeology

Results of the Class III cultural resources inventory for the mine/mill site are presented in Table 2-9. Twenty-seven prehistoric sites and one historic site were found and recorded during the survey. Five of the prehistoric sites, three lithic scatters (26NY4354, 4371, and 4014) and two rock shelters (26NY4358 and 4360) were identified as potentially significant and subject to direct or indirect impact by mining operations. These sites were recommended by Archaeological Research Services for further testing and evaluation. Results of that program are described in Section 3.9.

Twelve cultural resource sites were identified during surveys of the transmission line corridors (Sierra Pacific Power Company 1984a). All but three sites were collected during field surveys. The remaining sites include two small lithic scatters and a quarry site and lithic scatter located on the proposed transmission line corridor.

2.10 Visual Resources

The BLM Visual Resource Management (VRM) system has been applied to the area surrounding the proposed Paradise Peak Project site to systematically characterize the visual environment. The VRM system inventories existing scenic quality and assigns visual management categories based on a combination of scenic values, visual sensitivity, and viewing distance zone. Five VRM classes have been established to provide guidance in ascertaining the degree of modification acceptable to the landscape affected by proposed activities (Appendix A). The entire visual study area surrounding the proposed project has been designated VRM Class IV, the least restrictive class that can be applied to an undisturbed area.

The scenic value of the study area was rated A, B, or C based on the scenic quality of a rating unit in relation to other units in the area. The immediate vicinity of the project site was rated entirely Class C, the lowest relative quality scenery, based on the lack of distinguishing features and the homogeneous color and texture imparted by the ubiquitous sage/grass vegetation.

TABLE 2-9

ARCHAEOLOGICAL SURVEY FOR THE MINE/MILL SITE

Site #[1]	Site Type	Size m^2*	Location/Landform	Description
4363	Isolate	N/A	Valley edge/nearly level floor	White chert biface midsection
4364	Isolate	N/A	Valley edge/nearly level floor	White chalcedony biface base
4365	Isolate	N/A	Valley edge/nearly level floor	Chert flake
4366	Small lithic scatter	1 m^2	Valley edge/nearly level floor	Fewer than 10 pieces of debitage
4348	Isolate	N/A	Valley edge/channel of intermittent wash	White chert biface (collected)
4367	Small lithic scatter	1 m^2	Valley edge/nearly level floor	Five white chert flakes
4349	Isolate	N/A	Valley interior/nearly level floor	Cherk flakes
4350	Small lithic scatter	235 m^2	Valley interior/base of slight rise	Relatively sparse scatter (maximum density 10-15/m^2); 2 bifaces; core
4351	Small lithic scatter	353 m^2	Valley interior/base of slight rise	Sparse scatter - scatter of similar secondary and tertiary chert flakes
4352	Small lithic scatter	314 m^2	Valley interior/base of knoll	Sparse lithic scatter of chert and obsidian; 1 possibly utilized flake; cores
4353	Lithic scatter	863 m^2	Valley interior/saddle between and base of small knolls	Sparse lithic scatter primarily chert, some obsidian; 2 utilized flakes
4354	Lithic scatter/ opportunistic quarry	73,000 m^2	Mountain slope/top and slope of knoll and saddle between two knolls	Natural outcrops and cobbles; sparse scatter of primary and secondary flakes; cores
4355	Lithic scatter with groundstone	1,885 m^2	Valley interior/nearly level floor	Sparse scatter, chert secondary flakes; slab metate not extensively utilized

TABLE 2-9 (CONTINUED)

Site #[1]	Site Type	Size m^2*	Location/Landform	Description
4356	Isolate	N/A	Valley interior/nearly level floor	Utilized flakes
4357	Small lithic scatter	157 m^2	Valley interior/nearly level floor	Sparse scatter less than 25 flakes; no tools
4358	Small rockshelter	N/A	Mountain slope/base of mountain	Shelter approx. 6 m deep; 4 m wide; 2 m high; sparse scatter in front and interior, possibly utilized flake; core (possibly associated with PP-12)
4359	Isolate	N/A	Mountain slope/top of drainage	Modified flake
4368	Isolate	N/A	Valley interior/nearly base of large hill	Flake
4369	Isolate	N/A	Valley interior/nearly level floor	Utilized triangular cobble
4370	Small lithic scatter	3 m^2	Valley interior/nearly level floor	Chert flakes, 1 obsidian, 1 utilized flake
4371	Lithic scatter	2,000 m^2	Valley interior/slight rise between two washes (valley floor)	Lithic scatter with a high ratio of bifaces (10+) and intensively utilized simple flake tools
4372	Isolate	N/A	Valley edge/edge of channel of intermittent wash	Metate
4373	Isolate	N/A	Valley interior/nearly level floor	Flake
4360	Rockshelter	25 m^2: shelter 3,769 m^2: camp, plus around outcrop	Valley edge/nearly level floor	Moderate lithic scatter; groundstone; tools including utilized "scrapers", hammerstone, all material types

TABLE 2-9 (CONTINUED)

Site #[1]	Site Type	Size m^2*	Location/Landform	Description
4361	Isolate	N/A	Valley interior/slope of small ridge	Core (possibly associated with PP-26)
4014	Lithic scatter/ opportunistic quarry	247,400 m^2	Mountain slope/base of mountain and valley interior/moderate slope between	Large sparse scatter primarily primary and secondary chert flakes; other debitage; core with at least one area of naturally occurring material outcrop
4362	Historic mine	N/A	Mountain slope/base of mountain	Mine shaft reinforced with timbers; purpled glass fragment and aqua bottle fragment; some wood and metal
4374 (on corridor)	Lithic scatter	23,562 m^2 within corridor	Valley interior/slope and base of ridge overlooking wash	Chert debitage, sparse less than 50; 3 cores

Source: ARS 1984

*Site size is calculated as area = 3.1416 (length x width)/4.

[1]Site numbers are permanent site numbers assigned by the Nevada State Museum. The full number consists of the prefix "26NY" followed by the four digits shown in the table.

The visual sensitivity of the site was also rated low. This rating applies because the site is visible only from areas that receive low to medium levels of use and viewer concerns about visual quality in the area are believed to be a low priority. The site is screened from viewers by a prominent ridge wrapping around the site on the south, west, and northwest. Hills also screen all but the top of the hill composing the main ore body from viewers on the north, including residents of Gabbs. The site is visible sporadically to viewers approaching the site on State Route 89 from the southeast as the undulating terrain allows. Route 89 is a gravel surface road carrying an average of approximately 20 vehicles per day. There are no major viewpoints or active recreation sites from which the project site is visible.

The BLM Carson City District completed the visual resources analysis for the proposed 120 kV transmission lines. All of the proposed alignment was rated Class IV except for the five-mile section where the line would cross the Gabbs Valley Range. This area was rated as Class III due to the presence of colorful rock outcrops (Class B scenery) and its proximity to viewers traveling on Nevada State Highway 361 (Medium viewer sensitivity). The portions of the proposed corridor nearest the highway have been disturbed by recent mining activity, creating strong existing visual contrasts.

2.11 Socioeconomics

The primary study area for the socioeconomic assessment included Mineral County in western Nevada including the communities of Hawthorne, Babbitt, Walker Lake, Mina, and Luning, and the town of Gabbs in Nye County. Secondary attention was given to the communities of Tonopah in Nye County, and the community of Fallon in Churchill County. Hawthorne received special emphasis because preliminary analyses indicated it would be the focus of project-related socioeconomic impacts. Hawthorne is the nearest community large enough to provide basic amenities that many workers would want and none of the smaller communities closer to the project site has any substantial amount of housing available. Tonopah and Fallon are farther from the site than Hawthorne and neither provides housing opportunities that would be sufficiently more attractive in terms of cost or amenities to overcome the greater distance.

There are no incorporated towns within Mineral County; therefore all administrative functions are provided by the county government. Federal agencies such as the Forest Service and Bureau of Land Management (BLM) play a major administrative role in Mineral County since nearly 90 percent of the land is under federal control. Until December 1980, the U.S. Army operated the Hawthorne Army Ammunition Plant (HAAP), the county's largest employer. At that time, HAAP operations were turned over to a private contractor, Day & Zimmerman, Inc., and Frank E. Basil, Inc. (DZB). The other major federal jurisdiction is the Walker Lake Indian Reservation, which lies in northern Mineral County and southern Churchill County. The reservation is administered by the Bureau of Indian Affairs, with agency and tribal headquarters located at Schurz.

Nye County government is located in Tonopah; Gabbs is the only incorporated city in the county. Churchill County government is located in Fallon which is the only incorporated city in the county.

Additional information used in the socioeconomic assessment is available in the Socioeconomics Technical Memorandum.

2.11.1 Population

The populations of Mineral and Nye Counties have fluctuated markedly between 1960 and 1980. Mineral County/Hawthorne experienced an 11.4 percent increase between 1960 and 1970, growing from 6,329 to 7,051 residents. Since 1970, population numbers have decreased somewhat to a 1980 population of 6,217, an 11.8 percent decrease (U.S. Bureau of the Census 1980). This is primarily due to the decrease in employment at the Hawthorne Army Ammunitions Plant (HAAP).

Nye County population increased by 106 percent between 1960 and 1980. Most of this growth occurred between 1970 and 1980 (62 percent) and can be attributed to increased government and mining activity. The 1983 population of Gabbs is estimated at 700. Population fluctuates with the employment levels at the C.E. Basic magnesite mine and mill, which represents the primary employer in Gabbs.

Churchill County has grown 64.6 percent from 1960 through 1980. The steady population gain can be attributed to a stable economic base

which includes agriculture and the military. Table 2-10 shows the populations of Mineral County, Hawthorne (including Walker Lake), Babbitt, Luning and Mina, Nye County, Tonopah, Gabbs, Churchill County, and Fallon.

2.11.2 Economic Base

The economies in Mineral and Nye Counties depend largely on two basic industries, mining (oil and hardrock) and military service activity including the HAAP and Nellis Air Force Test Site outside of Tonopah. The Churchill County economy, specifically in the Fallon area, is based on agriculture and is currently experiencing growth due to expansion at the Fallon Naval Air Station.

2.11.3 Employment and Income

Due to the nature of the primary industries in the area (mining, agriculture and military), it is understandable that fluctuations in employment and income occur regularly. The frequent upswings and downturns of the major economic sectors cause instability among the non-basic sectors and result in fluctuations in unemployment rates and a general sense of economic instability. Table 2-11 shows employment by place of work from 1978 through 1982 for Mineral, Nye, and Churchill Counties.

In 1981 in Mineral County a shift from the government sector to the services sector occurred when DZB took over the contract operations of HAAP in Hawthorne. Employment in the government sector has continued to decline since that time. The large services sector employment is directly dependent on the limited federal government involvement at the plant.

In Nye County, fluctuations in the mining and construction sectors have occurred throughout the period. The services sector represents 67 percent of the total wage and salary employment and has shown a steady increase from 1979 through 1983. Recently, employment at the C.E. Basic mine and mill has dropped to 70 full-time employees. If the current market situation for magnesite does not improve, it is likely more layoffs will occur.

TABLE 2-10

STUDY AREA POPULATION 1960 - 1980

	1960	1970	1980	Percent Change 1960 - 1980
Mineral County	6,329	7,051	6,217	<1.8>
Hawthorne	2,838	3,539	3,741	31.8
Babbitt	2,159	1,579	980[1]	<54.6>
Mina/Luning	NA	355	456	NA
Nye County	4,374	5,599	9,048	106
Tonopah	1,679	1,716	1,952	16.3
Gabbs	770	874	811	5.3
Churchill County	8,452	10,513	13,917	64.6
Fallon	2,734	2,959	4,262	55.8
Nevada	285,278	488,738	800,508	180.6

Source: U.S. Bureau of the Census, Census of Population 1950, 1960, 1970, 1980.

[1]1980 Babbitt population estimate is included in Hawthorne estimate.

NA - Data not available.

TABLE 2-11

EMPLOYMENT BY PLACE OF WORK, 1979 - 1983

	1979[1]	1980[1]	1981[1]	1982[1]	1983[2]	1983 Percent of Total
Mineral County						
Farm	13	13	13	13	NA	<1
Mining	D	D	0	D	260	11
Construction	78	117	144	81	10	<1
Manufacturing	L	L	L	L	L	<1
Transportation and Public Utilities	47	40	45	37	60	2
Trade	229/0	223/0	239/0	224/0	210	9
F.I.R.E.	34	33	35	29	30	1
Services	552	628	1,149	1,268	1,330	55
Government	1,289	1,229	622	643	540	22
Total Wage and Salary Employment	2,242	2,283	2,247	2,295	2,440	100
Unemployment Rate	4.1%	3.7%	4.8%	8.4%	7.6%	
Nye County						
Farm	75	76	74	74	NA	
Mining	801	1,060	1,545	1,433	1,140	13
Construction	108	350	371	164	110	1
Manufacturing	85	84	91	91	80	<1
Transportation and Public Utilities	115	0	153	D	130	2
Trade	296	399	459/0	446/0	480	6
F.I.R.E.	303	D	0	D	150	2
Services	3,457	3,851	4,524	5,538	5,700	67
Government	931	771	782	782	730	9
Total Wage and Salary Employment	6,171	6,591	7,999	8,528	8,520	100
Unemployment Rate	2.9%	4.2%	4.5%	8.0%	8.0%	
Churchill County						
Farm	245	244	239	238	238	6
Mining	D	94	118	44	20	<1
Construction	228	219	209	172	190	5
Manufacturing	173	174	195	187	160	4
Transportation and Public Utilities	D	118	120	130	100	3
Trade	804	918	846	808	860	22
F.I.R.E.	108	105	116	108	120	3
Services	782	790	800	888	920	23
Government	2,200	2,310	2,038	1,996	1,330	34
Total Wage and Salary Employment	4,540	4,972	4,681	4,571	3,938	100
Unemployment Rate	5.9%	6.8%	8.2%	13.6%	13.6%	

D - Not shown to avoid disclosure.

L - Fewer than 10 jobs.

[1]Bureau of Economic Analysis, 1979-1983.

[2]Nevada Employment Security Department, July 1983.

Total wage and salary employment in Churchill County is primarily composed of the government, services, and trade sectors. Agriculture is a very important sector of the Churchill County economy, although agricultural employment represents only 6 percent of total employment. Employment in the county has declined in all sectors except services since 1980.

Unemployment rates in Mineral and Nye Counties have remained lower than the state average of 10.6 percent in 1983, despite fluctuations in employment among sectors. This implies that population out-migration has kept pace with changing job opportunities. Churchill County showed a higher unemployment rate than either of the other two counties or the state, at 13.6 percent for 1983.

Between 1977 and 1982 per capita income in Mineral (78.2 percent) and Churchill (58.0 percent) Counties increased faster than the state (54.0 percent). Nye County per capita income increased by 50.8 percent for the same time period. However, the 1982 state per capita income figure of $12,022 was higher than all three counties; Mineral ($10,896), Nye ($9,711), and Churchill ($10,192).

Churchill County has grown at a steady pace, although declines in employment have occurred during the period. Employment and population data suggest that both the Mineral and Nye County economies have experienced unstable economic periods for the representative major economic sectors. Both counties are currently working to diversfy their economies to improve future stability. In the short term, however, the renewed interest being shown in mineral exploration could, if it results in viable projects, postpone further layoffs in the mining sector as existing projects near completion.

2.11.4 Public Fiscal Conditions

Financial resources of the study area refer to government revenue sources and expenditures in Mineral and Nye Counties and their communities. These financial statistics are important because they directly affect how the area can adjust to new industrial development. Churchill County was excluded from the analyses, because no major project-related expenditures are anticipated in the county and the projected population effects on the county would be too small to affect public costs or revenues significantly.

From 1982 to the current fiscal year 1985, assessed valuation throughout the area has grown at a moderate rate. Table 2-12 shows assessed valuation for Mineral and Nye Counties, Gabbs, and Tonopah. Mineral County showed the most growth at an average rate of 13.6 percent annually. From 1983 to 1984, assessed valuations dropped in Nye County and Gabbs reflecting the downturn in the mining industry. The current financial situation of the city of Gabbs is deteriorating due to the reduction in net mine proceeds and property tax from the C.E. Basic mine. The Mineral County assessed valuation grew at a much slower rate than the previous year showing only a 6.8 percent growth rate.

Mineral and Nye Counties operate largely with funds generated from local and state sources. Inter-governmental revenues represent close to 50 percent of the total allocated for operating expenditures for both counties, and 64 percent in Gabbs. Basic and supplemental city and county relief tax receipts comprise over 45 percent of the general fund revenue for Mineral and Nye Counties and Gabbs, ad valorem and other taxes contribute approximately 20 percent.

General government and public safety activities represent the largest expenditure outlays for all three governments. During the period, expenditures have increased at a faster rate than revenues: in Mineral County, 12.4 percent compared to 2.2 percent; in Nye County, 7.3 percent compared to 4.4 percent. In Gabbs, revenues have decreased by 17 percent, expenditures have increased by 1.6 percent.

Hawthorne's revenue sources and budget are relatively small because the county provides most public facilities and services. Water, sewer, and garbage revenues are the largest sources of funds, but do not exceed expenditures for these services. The next greatest revenue sources are state and local gaming license fees, followed by franchise taxes. The 1984-1985 general fund revenues are expected to total $158,200 (Nevada Department of Taxation 1984a). Hawthorne's budgeted general fund expenditures are greatest for the fire department, followed by administration.

Bonded indebtness is limited by state statute to 10 percent of the last assessed valuation for the county. Neither Mineral nor Nye County are close to their statutory limit. Mineral County's outstanding debt is $105,224. Nye County's total debt is $1,067,042, of this total $265,000 is general obligation indebtedness. Total debt in Gabbs is $42,244.

TABLE 2-12

ASSESSED VALUATION BY JURISDICTION

	Tax Rate/ $100 of Assessed Valuation	Fiscal Year[1] 1982 - 1983	Fiscal Year[1] 1983 - 1984	Fiscal Year[1] 1984 - 1985	Average Annual Increase
Mineral County	$0.8391	$57,906	$70,053	$74,840	13.6%
Nye County	0.6457	252,225	285,332	280,987	5.5%
Gabbs	0.5045	5,533	6,989	6,215	5.9%
Tonopah	0.1167	25,289	27,951	29,006	7.1%

Source: Nevada Department of Taxation 1984a.

[1]Thousands of dollars.

The ability of local governments to raise the funds necessary for capital improvements in Nevada is restricted by a state law that imposes limitations on taxation. The combined total taxing rate, which includes the county, city, and school districts, cannot exceed $3.64 per $100 of assessed valuation. Although this limitation can be raised by special exception to $3.94, with the additional levy being available only to school districts, this is the maximum rate that a taxpayer can pay to all taxing jurisdictions, i.e., state, school, and local, including bond repayment (Nevada Department of Taxation 1984b).

Currently the combined tax rate in Mineral County is $1.8747 per $100 assessed valuation, of which $0.8376 goes to the county to support all county and town functions, and $0.8860 is allocated to the Mineral County School District. In Nye County the combined tax rate is $1.8906 per $100 assessed valuation, of which $0.6461 goes to support county and town functions, and $1.1489 is allocated to Nye County Schools. The Gabbs tax rate is $0.5045.

2.11.5 Housing

The condition and availability of housing stock varies throughout the region. Mineral County showed an increase of 542 units from 1970 through 1980. Nye and Churchill Counties both showed increases of 2,195 and 2,065, respectively. On a percentage basis these increases were significantly higher than in Mineral County.

Table 2-13 shows total housing units for Mineral, Nye, and Churchill Counties for 1970 and 1980 through 1983.

Owner-occupied units in the region represent 66 percent of occupied units in all three counties, 83 percent in Hawthorne. This is an increase of between 6 percent and 14 percent since 1970.

The condition of housing varies from county to county. The largest percentage of housing in Mineral County/Hawthorne was constructed prior to 1970. There has been a substantial number of housing units constructed in Churchill (40 percent of total housing stock) and Nye (50 percent) Counties since 1970. The age of the housing stock has a large influence on the condition of the units, because prior to 1950 many homes were not built to any building codes.

TABLE 2-13

TOTAL HOUSING UNITS IN THE PARADISE PEAK STUDY AREA

County	1970	1980[1]	1981[2]	1982[2]	1983[2]	Change 1980-1983
Mineral	2,477	3,019	3,028	NA	3,034	0.5
Nye	2,097	4,292	4,295[3]	4,301[3]	4,312[3]	0.5
Churchill	3,709	5,774	6,022	6,071	6,103	5.7

[1]U.S. Bureau of the Census 1980.

[2]Authorized by City or County building code; does not include mobile homes.

[3]Includes only building permits for City of Gabbs; no county building code.

In Churchill County 63 percent of all units are single family, 20 percent multi-family, and 17 percent mobile homes. In Nye and Mineral County the percentage breakout is: 46 percent and 60 percent single family, 9 percent and 26 percent multifamily, and 45 percent and 15 percent mobile home (U.S. Bureau of the Census 1980). In Hawthorne 72 percent are single family, 7 percent multi-family, and 11 percent mobile homes.

Housing costs and availability differ throughout the area. Mineral County housing costs are significantly lower than Nye and Churchill Counties. In 1980 the median value for a single family and mobile home unit was $33,200 in Mineral County, $35,600 in Nye County, and $58,900 in Churchill County. In 1984 the average sales price for a single family home is between $45,000 and $55,000 in Hawthorne, $60,000 in Tonopah, and $60,000 in Fallon (Prockish, C. Issom, and W. Issom 1984, personal communications). Rents in the area are substantially higher in Tonopah averaging $455/month compared to $350 to $425 in Hawthorne and $265 to $350 in Fallon.

Table 2-14 shows the existing housing stock in communities in the Paradise Peak area, including vacancy rates, rental rates, houses for sale, and temporary accommodations. As can be seen from the table, there are very few vacancies available throughout the area. A total of 34 rental units can be found in the 5 communities. Houses for sale total 36. There are currently 20 trailer spaces available in Hawthorne, 20 in Mina, a potential for 20 in Gabbs, and 1 in Luning. Temporary housing is also limited; there is currently a total of 275 motel units. Occupancy rates have been higher than in the past few years with the El Capitan reporting an occupancy rate of 95 percent. Other motels have slightly lower occupancies.

Developable land is available in all three counties and communities. Much residential construction is occurring in both Fallon and Tonopah due to anticipated increase in military activity, which should ease the tight rental markets in those communities.

The housing stock in Gabbs is generally older and many units are substandard. C.E. Basic owns approximately 115 single family houses, apartments, and trailers in South Gabbs. All housing is occupied by Basic employees and their families. Privately owned housing totals approximately 122 units.

TABLE 2-14

EXISTING HOUSING STOCK IN THE PARADISE PEAK PROJECT VICINITY

	Hawthorne/ Walker Lake	Babbitt/ Base	Mina	Luning	Gabbs
Population					
1980[1]	3,741		310	145	811
1983[2]		524	300		700
Housing Units					
Single Family (SF)	1,032/65[3]		72[3]	15[3]	NA
Multi Family (MF)	104/12[3]	214 (Duplex)	6		NA
Mobile Home (MH)	229/23[3]		111	24	NA
Total	1,424/100[3]	212/146[4] 265	201	39	Basic 115[5] Other 122
Vacancy					
Percent	0-2%[4]	9%[4]	NA	NA	6%[5]
Number	20	20	NA	NA	14
Rent					
SF/2 bedroom	$300-350[6]		$250-300		$200[5]
SF/3 bedroom	400-450	$237[4]			
SF/4 bedroom		276			
MF/1 bedroom	250-300	182			Basic 47.50
MF/2 bedroom	325-350	205			
MH	250-350				Basic 90.00 Other 150.00
Housing for Sale					
All units	34[6]	265	1	1	0[5]
Range of Values	$10,000-80,000		$28,500		$18,000-40,000
Average price	$45,000-55,000				$25,000
Temporary Housing					
Motel	232[7]	0	(30) 26[8]	0	8
R.V/Trailer space	NA	0	20	NA	8

[1]U. S. Bureau of the Census 1980

[2]Local and state estimates

[3]Mineral County Housing Survey with updated information from personal communications; total includes "other" and "not ascertained" unit types.

[4]Wilson 1984, personal communication: Babbitt also contains 265 uninhabitable structures; these cannot be rented by the general public.

[5]Judd and Butler 1984, personal communications, vacant units are all mobile homes.

[6]C. Isom, Adams, Graf, and Prockish 1984, personal communications

[7]Hawthorne Chamber of Commerce

[8]Wilson 1984, personal communication; four units are contracted to the railroad during the week Monday-Thursday.

Housing is also very tight in Gabbs. Currently there are 14 mobile homes available for rent. No single family units are available for rent. Rents are very low in Gabbs. C. E. Basic housing rents are $47.50 for a one-bedroom apartment and $90 for a three-bedroom mobile home. Privately owned housing rents are $150 for a mobile home and $200 for a single family two-bedroom home. There are no houses for sale at this time, but the average sales price for a two-bedroom home has been $25,000.

Luning and Mina are the closest towns to the Paradise Peak Project except for Gabbs. Both Mina and Luning have the potential to supply some housing for the construction and operations workforce of the Paradise Peak Project. Currently Luning has 39 housing units with the potential to develop 10 additional sites. Mina has 201 units with development potential of 50 to 70 sites. Mina has 30 motel units and 20 mobile home spaces available for rent.

The uncertainty of the status of several military programs in the study area and the mining industry in Hawthorne, Gabbs, and Tonopah have contributed to the tight housing market. Developers are reluctant to take substantial risks when economic conditions are so volatile. Under different scenarios, an abundance of housing could be available or a tremendous additional demand could be created throughout the study area.

2.11.6. Public Services and Facilities

Many public facilities and services in the study area are provided by each county since communities are generally unincorporated. Existing design capacities and staffing levels of public facilities and services in the region are considered adequate for demand and many have excess capacity. Health care is provided by hospitals in Hawthorne, Tonopah, and Fallon with a limited number of resident physicians, supported by doctors who visit the towns on a weekly basis.

Law enforcement in the region is the responsibility of county sheriff's departments, headquartered at the county seats. Gabbs has its own two-man police force. Mineral County's 21 sheriff's officers are stationed in Hawthorne. Law enforcement services in Mina and Luning are provided by two sheriff deputies stationed in Mina. Fire protection services are provided by volunteer departments in each community. Each has adequate equipment and also provides ambulance service.

The Consolidated Agency for Human Services (CAHS) in Hawthorne, as well as the Nevada Department of Welfare Services, provides a complete range of social services in the area. The CAHS has in the past experienced dramatic caseload increases after construction of large-scale projects has been announced to the public. Existing CAHS staffing is considered adequate for current demand.

Schools in Gabbs and Hawthorne have experienced declining enrollment and have excess capacity. Urban recreation opportunities are very limited in all but the largest communities.

Public water supply and wastewater treatment facilities have adequate existing capacity or are in the process of expansion. Only the City of Gabbs has water supply problems that will limit its ability to grow. The city is under a state-imposed moratorium on new water service hookups until fluoride levels in the water meet state standards. No known, specific, funded proposals have been recorded to improve this situation, therefore, the city cannot supply water to other than existing hookups. Hawthorne utilities has completed the exploration stage of the Whiskey Flat Project, which would greatly expand the town's water supply. Construction is expected to begin in 1985.

Electricity is provided in the study area by Sierra Pacific Power Company, with headquarters in Hawthorne. There is adequate generating capacity to service the mine needs and those associated with incoming population; however, the transmission line serving Gabbs does not have enough capacity for the mill. Telephone service is provided by Nevada Bell which has adequate capacity to serve the area.

3.0 ENVIRONMENTAL CONSEQUENCES

Chapter 3 presents a discussion of the environmental consequences that would result from the construction, operation, and abandonment of the Paradise Peak Project or alternatives. Impacts associated with the proposed transmission lines have been addressed in separate EAs (Sierra Pacific Power Company 1984a and 1984b) and are summarized here where appropriate. The chapter is organized as follows: Sections 3.1 to 3.11 present conclusions of the environmental consequences by resource topic, Section 3.12 lists recommended mitigation and monitoring programs, and Section 3.13 provides a summary and comparison of alternatives.

3.1 Air Resources

The Paradise Peak Project is expected to emit particulate matter (PM), mercury, and small amounts of other pollutants during operation. The expected magnitude of pollutant emissions is listed in Table 3-1. The largest source of emissions would be PM from the mining operations. FMC proposes to use standard pollutant control practices to reduce emissions to the atmosphere. This includes the use of wet scrubbers on process dust sources, such as crushing and screening, and application of water or chemical suppressants to minimize dust from haul road traffic. The Proposed Project would meet all applicable New Source Performance Standards (NSPS) for metallic minerals processing plants.

Air quality impacts of PM from the mill area would be regulated by the Nevada Division of Environmental Protection (NDEP). A summary of the estimated maximum PM impacts is presented in Table 3-2. The impact assessment includes contributions from the C. E. Basic plant near Gabbs and natural background. Impacts of PM from point sources are predicted to be below the applicable Nevada air quality standards.

Impacts of PM from mining operations are regulated by NDEP by requiring a specific permit for surface disturbances. The permit will probably require specific dust control measures in the mining operations. Dispersion modeling of PM concentrations from mining operations is not required in the NDEP permitting process since there are no reliable emission factors or dispersion models for use with hard

TABLE 3-1

SUMMARY OF AIR EMISSIONS, PARADISE PEAK PROJECT

Pollutant	Emissions (lb/day)
Particulate Matter - Mine	4,154 - 9,320[1]
Particulate Matter - Plant	557
Mercury	2.5
Hydrocarbon	7
Nitric Acid	1
Hydrogen Cyanide	0.09
Sulfuric Acid	0.5
Hydrochloric Acid	0.5

[1]Because fugitive dust emissions cannot be measured directly there is wide variability in the emission factors available for use in estimating mining emissions. In addition, most mining emission factors have been derived for surface coal mines and their accuracy at depicting hard-rock mining emissions has not been established. Because of the characteristics of hard-rock, in comparison to coal, hard-rock emissions may be significantly lower than those for coal mines, and consequently significantly lower than those shown in the table. The range of emission levels indicated are not intended as concrete numbers, but rather to illustrate that fugitive dust from the mine is the primary air emissions source associated with the project.

TABLE 3-2

MAXIMUM TOTAL PARTICULATE CONCENTRATIONS ($\mu g/m^3$)
FROM PROCESSING FACILITIES

Averaging Time	Contribution of Paradise Peak	Contribution of C. E. Basic	Background	Total	Nevada Air Quality Standard	Percent of Standard
24-hour	32	60	40	132	150	88
Annual	18	8	14	40	75	53

rock mining operations. However, PM impacts of mining are expected to be highly localized and decrease rapidly with downwind distance. This is due to the tendency for the large fugitive dust particles typically associated with mining to rapidly settle out of the plume.

The impact of plant-wide mercury emissions is depicted in Table 3-3. Mercury emissions are expected to be well under suspected levels of toxicity to humans, animals, and vegetation. Short-term mercury sensitivity thresholds were derived from the Threshold Limit Values (TLV) (ACGIH 1979). These TLVs have been set as occupational health standards for workplace exposure over an 8-hour day and 40-hour week. Comparison of 1-hour average impacts to the 8-hour average TLV results in a worst-case assessment. For an 8-hour average impact to be as high as the predicted 1-hour impact, the worst-case dispersion conditions associated with the 1-hour impact would need to occur during 8 consecutive hours. This is an extremely unlikely occurrence. Longer term mercury thresholds were derived from appropriate Estimated Permissible Concentrations (EPCs) published by EPA in the document "Multimedia Goals for Environmental Assessment". EPCs reflect safe levels of continuous exposure, and are representative of annual averages.

The impacts from other pollutant emissions, such as hydrogen cyanide, nitric acid, sulfuric acid, hydrochloric acid, and hydrocarbons would also be insignificant, primarily because of the relatively small magnitude of these emissions.

3.2 Geology and Mineral Resources

The geology and mineral resources impact assessment emphasized three primary topics:

- Potential geologic hazards to project facilities or human life;
- Potential hazards created by project facilities; and
- Potential effects on future extraction of economic mineral resources.

TABLE 3-3

ASSESSMENT OF MERCURY IMPACTS, PARADISE PEAK PROJECT

Impacts	Location of Exposure	Concentration ($\mu g/m^3$)	Averaging Time	Threshold ($\mu g/m^3$)	Percent of Threshold
Human Health	Worst-Case	1.6	1-hour	50.0	3
Human Health	Most Likely Exposure	0.7	1-hour	50.0	1
Human Health	Worst-Case	0.06	Annual	0.12	50
Human Health	Most Likely Exposure	0.03	Annual	0.12	25
Soils/ Vegetation	Worst-Case	0.14	Annual	1.0	14

Geologic hazards identified at the site include seismic hazards and isolated occurrences of expansive soils. Expansive soils are a relatively minor concern due to their limited extent and because geotechnical investigations and foundation designs were undertaken to address this problem. Seismic hazards include ground shaking and possible effects of soil liquifaction. FMC conducted geotechnical investigations and utilized specialized design to mitigate potential damage to facilities in the event of a major earthquake. The area of greatest concern would be the tailings dam where dam failure could release large quantities of tailings which could cause localized severe environmental damage. Dam failure is extremely unlikely due to the design criteria for the dam used by Harding Lawson & Associates.

Geologic hazards created by project activities would include steep slopes in the mine pit and waste piles and creation of saturated soil conditions that may give rise to hydrocompaction or liquification of susceptible soils. Steep slopes in the mine pit would be comparable to rock outcrops on nearby ridge tops. The horizontally bedded volcanic rocks exhibit moderate stability on natural slopes, and would be expected to be stable in the mine pit except where local fracture and joint patterns may dip in the direction of the pit wall. Safety benches would be cut into the pit walls during operation and abandonment of the mine which would contribute to stability and reduce the rockfall hazard in the pit.

Slopes on waste rock piles would be left at the angle of repose, assumed to be 37° (Pincock, Allen, & Holt 1984). These slopes would become unstable if triggered by a major earthquake, if pore pressure were increased by water saturation, or if the slope toe were removed (e.g., by erosion or excavation). At the angle of repose, even minor disturbances such as livestock or vehicle traffic would cause downslope soil movement. Slope failures in waste rock piles would probably be small in scale and not catastrophic. However, they would inhibit revegetation and effectively limit future land use of affected areas.

Fine sandy soils occurring at the tailings impoundment site are subject to liquifaction if saturated and subject to shaking from an earthquake. The impoundment would be lined to contain tailings liquor.

Design investigations have concluded the liner would prevent seepage under the dam which could otherwise saturate alluvial soils beneath the downstream toe of the dam and present a potential liquifaction hazard (Harding Lawson & Associates 1984e).

The Proposed Project would not prevent future extraction of economic mineral resources. Condemnation drilling has been conducted by FMC to avoid placing waste piles, mill facilities, or tailings over mineralized zones. Low-grade ore would be stockpiled in a segregated waste pile to allow for future processing if warranted by economic conditions. An inactive small-scale mercury mine would be consumed by the proposed mine pit. However, this does not constitute a loss of mineral reserves because the proposed operation would produce approximately 200,000 pounds of mercury per year in addition to precious metals. Mercury would be produced strictly as a by-product of the primary recovery effort for gold and silver.

The Proposed Project would recover approximately 90 percent of gold, 70 percent of silver, and 80 percent of mercury contained in the processed ore. This would result in beneficial economic use of mineral resources.

Proposed transmission line and water pipeline corridors would cross areas with inactive mineral rights claims. If these claims became active in the future, there would be potential conflicts between the transmission line or water pipeline and mineral extraction activities.

3.3 Paleontology

Although unique paleontological resources exist in the region, no paleontological sites are known to occur in areas that would be disturbed by the mine, mill, waste dumps, tailings dam, access roads, transmission line corridor, or any of the alternative water pipeline routes. The transmission line would intersect sedimentary formations in the Stewart Valley (outside of the proposed ACEC); however, impacts of power line installation would be minimal.

Indirect impacts to paleontological resources could result from surface collection, vehicle traffic, and other activity associated with increased human population and activity levels in the region. BLM has developed measures to protect known paleontological sites of high value,

including the proposed ACEC in the Stewart Valley. These protective measures, published in October 1984 in the Draft Walker Resource Area Management Plan, should effectively limit significant impacts to paleontological resources.

3.4 Water Resources

3.4.1 Groundwater

The groundwater analysis focused on the potential effects of groundwater pumping on existing water users and the potential for groundwater contamination from project facilities. No major impacts would be expected.

The effects of water supply development are expected to be similar at each of the alternative well field sites. Each well field has minor water rights within 3 miles, would produce primarily from the Quaternary-Tertiary valley fill aquifer, and has largely unknown aquifer characteristics and boundary conditions. Because the aquifer characteristics, boundary conditions, and specific well locations for each well field are unknown, a detailed comparative analysis was not possible. Instead, a hypothetical well field analysis, conducted under assumptions that may be applied equally to each of the alternatives, was developed to indicate the magnitude of effects that would result under any of the alternatives.

The following assumptions were used as input to a Theis aquifer simulation model:

- Two conditions were modeled: 1) no boundaries; and for a more conservative estimate, 2) an impermeable boundary located 1 mile from the production well and each of the observation points.
- The production well was pumping at a constant discharge of 1,000 gallons per minute (gpm) for 12 years.
- Aquifer transmissivity (T) was assumed to be 40,000 gallons per day (gpd)/ft based upon pumping tests at the South Wellfield area.
- Aquifer storage coefficient (S) was assumed to be 1×10^{-4} for the semi-confined aquifer based on pumping test results.

The estimated drawdown in piezometric surface elevation for the two boundary conditions assumed is shown in Table 3-4. The table shows drawdown at radial distances (r) from the production well from 1 foot to 3 miles. Additionally, the residual drawdown at r = 1 ft 12 years after pumping has stopped is given as an indication of long-term effects on aquifer storage. The worst-case condition is with the assumed impermeable boundary condition. In this case, maximum drawdown 1 mile away, after pumping at a constant discharge of 1,000 gpm for 12 years, was predicted to be 52 feet. Residual drawdown after 12 years of recovery was predicted to be 4 feet.

The maximum drawdown effects of water supply development are expected to be 28 to 52 feet at a distance 1 mile from the production well and result in temporary increased pump lifts for existing groundwater users. Although the groundwater pumping to supply the Proposed Project would exceed the rate of local groundwater recharge in the short term, the large volume of aquifer storage and the short duration of project operations make the long-term effects negligible.

The relative impacts of water supply development at each of the three alternative well field sites are greatly dependent upon the distance from production wells to existing wells and on the degree of existing groundwater use. Since exact locations of production wells are unknown, the distance from the center of each well field to the nearest existing well is used for comparison. The table below indicates the distance to the nearest well and the total number of water rights within 3 miles of each well field.

Well Field	Nearest Well	Number of Water Rights
Kelly Wells	0.9 mile	3
Graben	1.4 miles	2
South Wellfield	1.4 miles	2

The closer distance and greater number of existing wells at Kelly Wells suggests that impacts to existing groundwater users would be potentially more important at Kelly Wells than at the Graben or South well fields.

At the site of the proposed mine pit, mill, and tailings impoundment, the primary concern for impacts to groundwater resources would be aquifer contamination. Potential sources of contaminants

TABLE 3-4

ESTIMATED DRAWDOWN FOR A RANGE OF EXPECTED AQUIFER CHARACTERISTICS

Transmissivity (gpd/ft)	Storage Coefficient	Drawdown[1] (ft) at Given Distance (r)				Residual Drawdown[2] at r = 1 ft
		1 ft	1 mile	2 miles	3 miles	
No Boundaries:						
40,000	0.0001	77	28	24	22	2
Impermeable Boundary:						
40,000	0.0001	102	52	46	43	4

Source: ERT

[1]Drawdown at t = 12 years; after 12 years pumping at Q = 1,000 gpm.

[2]Residual drawdown at t = 24 years, r = 1 ft; after 12 years pumping and 12 years recovery.

include seepage from the tailings impoundment, landfill, waste rock piles, and spillage in the mill area. The volcanic rock that underlies the mine site and tailings area is not developed as an aquifer because of 1) great depth to water, 2) low well yield, 3) limited aquifer storage, and 4) poor water quality. For these reasons these rock units are not considered to be a regional aquifer.

Potential groundwater contamination from the landfill and waste rock piles would be limited by the low recharge rate at the site and the great depth to groundwater. At a recharge rate of approximately 1 percent of 8 inches of annual precipitation (Eakin 1962), 150 years would be required to recharge 1 foot of water. Depth to groundwater is approximately 180 feet in the waste rock areas. This depth allows for substantial attenuation of contaminants by percolation through unsaturated soil and rock before reaching groundwater. The arid climate would be a limiting factor that would prevent severe acid drainage problems associated with the iron sulfide-bearing waste rock.

Spillage and runoff from the critical area of the mill would be collected in floor sumps and a sedimentation pond lined with 40-mil high density polyethylene to prevent chemical solutions from entering the environment. Therefore, no groundwater impacts are expected. Fluids released to the sedimentation pond would be either pumped back into the process stream or evaporated.

The tailings impoundment has the greatest potential to degrade groundwater quality because of its relatively large area, the presence of cyanide and mercury compounds, and the constant presence of water in the impoundment during operations. The water would provide hydraulic head as a driving force and vehicle to transport dissolved contaminants.

The tailings impoundment would be lined with a 40 to 100-mil high density polyethylene synthetic liner. The liner material has a laboratory tested permeability of 1×10^{-11} to 1×10^{-12} centimeter/second which surpasses the NDEP design criterion of a uniform permeability of 5×10^{-7} centimeters/second. The ultimate field permeability of the liner will depend on how well sealing is accomplished at the seams and the number of tiny holes developed during construction. As a worst-case analysis, it can be assumed that the liner will approach the NDEP criterion. This criterion would limit

seepage from a full impoundment of 135 acres to 68 acre-feet/year, assuming a unit gradient. As water would no longer be added at the end of operations and the fine tailings would become consolidated and dewatered, the driving hydraulic head would no longer be present.

Therefore, potential groundwater contamination from the tailings impoundment would occur primarily during and shortly after the operational life of the impoundment. Compliance with requirements of a Water Pollution Control Permit issued by the Nevada Division of Environmental Protection would involve measures to monitor for, and recover, leachate from the tailings impoundment.

Although seepage of leachate from the impoundment will be limited by the liner, some seepage may occur. Accounting for the area of the impoundment filled over 12 years and the design criteria for liner permeability, the worst-case total seepage volume is estimated to be about 560 acre-feet over the life of the project. Uncontrolled, this seepage would move vertically downward through surficial soils and volcanic rock towards the saturated zone at a depth of approximately 230 feet (at well TS-1). Since the layer of surficial soils and the upper bedrock surface have higher permeabilities than deeper bedrock, seepage would also move horizontally along the alluvium-bedrock contact following topography toward the unnamed valley east of the tailings dam.

Because the valley fill sediments, soil, and bedrock are unsaturated to a depth of about 230 feet, a large proportion or possibly all of the seepage would be immobilized in overcoming soil moisture deficiencies before reaching any body of saturated groundwater. It is probable that no contamination would be detected in saturated groundwater zones.

Seepage would reach the saturated volcanic rock at depth beneath the tailings impoundment only if there are open vertical fracture zones that extend to this depth. Drilling logs from a well located at the downstream toe of the proposed dam (well TS-1) indicate that open vertical fracture systems are not likely because of a several hundred foot thick zone of blue-gray clay (altered andesite) above the saturated zone.

If, however, tailings seepage reached the saturated zone of volcanic bedrock, the contamination would probably be localized because of the compartmentalized and poorly interconnected nature of groundwater in these rock units. There would be no impact to the regional aquifer systems in the thick sequence of saturated valley fill.

3.4.2 Surface Water

Impact concerns regarding the effects of project construction and operation on surface waters include:

- the potential for changes in surface water quality and flow;
- the risks of structure failure or sudden pit water inflow from flash flooding;
- the potential for increases in soil erosion and ultimate sediment loading to streams, lakes, and ponds.

Impacts to surface water resources from the Proposed Project and alternatives are expected to be minimal as a result of the semiarid climate and the absence of significant surface water. No perennial surface water is present on the project site or in the Gabbs Valley closed basin which infrequently receives surface runoff originating on the project site. The highly improbable failure of the process plant runoff water control system during an intense precipitation event could result in some contaminated storm runoff water mixing with flow in ephemeral drainages immediately downstream. The risk of structure failure (including the tailings pipeline) or sudden pit water inflow from flash flooding is insignificant since project components occupy very small areas, are located at or near the sub-drainage area boundaries, and the flood peaks and volumes are relatively small and easy to handle.

The construction of the Paradise Peak Project would alter local drainage patterns and erosion rates. Natural channels in the vicinity of the project site are ephemeral with high natural erosion rates, and there are no downstream perennial or intermittent receiving waters. Therefore, increased sediment loading would not be a significant impact. Since there is no mean annual surface water yield from this site, the altered flow regime would not affect surface water yield.

3.5 Soils

Potential impacts of the Paradise Peak Project on native soil resources were evaluated to determine the extent to which project activities would result in either soil compaction or losses via burial or accelerated erosion, or soil contamination from milling wastes that could reach sufficient levels in soils to be significant to groundwater resources and forage use.

Construction and operation of the Paradise Peak Project would result in the unavoidable disturbance of about 354 acres of soil resources. On this acreage, approximately 674,000 cubic yards, or 418 acre-feet, is suitable salvageable topsoil. Under Reclamation Alternative A, no topsoil would be salvaged. Under Alternative B, approximately 217,800 cubic yards of topsoil would be required to topsoil the 135-acre tailings area to a target depth of 12 inches. Estimated salvageable reserves on the tailings area are 214,500 cubic yards; this is reasonably close to the anticipated volume needed. Under Alternative C, approximately 480,000 cubic yards would be needed to attain the 12-inch target replacement depth. Each of the sites for major project components (tailings area, mill site, and waste rock dumps) contains sufficient topsoil resources to attain the target depth by salvaging from the respective areas. The waste dump areas contain more salvageable soil than would be needed and could provide surplus soil to rectify any shortages that might occur.

Proposed construction of the tailings impoundment would utilize soil and other earth materials from the tailings impoundment area. The volume of material required from the impoundment area has not been specified, but the requirement to provide a smooth bedding for the synthetic liner suggests that a significant portion of the soils materials may be required for construction. This presents an apparent conflict with topsoil salvage objectives in the impoundment area. If this apparent conflict is significant, additional suitable soils materials could be salvaged from other component sites to meet the soil replacement needs of Alternative B; a shortage of approximately 20,500 cubic yards could be encountered under Alternative C.

The long-term impacts to soils, following mine abandonment, depend on the reclamation alternative eventually implemented. Under Reclamation Alternative A, suitable topsoil would not be salvaged and revegetation would rely on natural reinvasion. Soil resources would be buried under waste dumps, the tailings impoundment, and other facilities. Exposed areas would be subjected to erosive forces that would hamper natural plant invasion and stabilization. Rill and gully erosion would be expected on steep sideslopes of the mine and waste disposal areas. Wider, flatter areas would be subject to wind erosion. The end result would likely be accelerated erosion (in comparison to undisturbed areas) and, at best, slow vegetation establishment. Reclamation Alternative A would likely not allow post-mining land use of wildlife habitat and rangeland.

Under Reclamation Alternatives B and C, long-term impacts associated with the erosion of soil or exposed subsurface materials would be reduced. Soil salvage and reapplication to provide a seedbed and water-holding capacity, combined with reseeding of disturbed areas, would increase revegetation potential and promote long-term stabilization of treated areas. Under Alternative B, the tailings area would be revegetated. Under Alternative C, all areas but the mine pit and tailings dam face would be revegetated.

Concern over available topsoil resources on-site focuses on its use in future revegetation efforts. In general, salvaged topsoil has a more favorable particle-size distribution (and thus waterholding capacity and/or aeration) than waste materials derived from rock. Fertility and microbial relationships are also generally better in topsoil, although possibly marginally so after a long period of stockpiling. Overall, regraded topsoil is typically easier to work and grows plants better than topsoil substitutes.

Potential topsoil substitutes have not been evaluated due to a lack of information on the physical and chemical characteristics of waste rock materials. Depending on the nature of these materials, topsoil substitutes could potentially be used to provide a suitable seedbed for

vegetation efforts and meet the reclamation objectives of Alternatives B or C. Use of topsoil substitute materials could offer an important economic benefit for these alternatives, since topsoil handling is both labor and equipment intensive. The characteristics of potential topsoil substitutes need to be better predicted, so that valid decisions can be made regarding topsoil salvage or topsoil substitution.

3.6 Vegetation

Impacts associated with the construction and operation of the FMC Paradise Peak Project include vegetation removal, loss or reduction of plant productivity, and potential destruction of a population of a rare plant species.

A total of approximately 354 acres would be affected by the proposed mining and facility construction activities (e.g., mine and waste dumps, mill and processing facilities, roads, tailings pond). The majority of the disturbance would occur in the greasewood vegetation type which dominates the region (Table 3-5). The majority of the bunchgrass vegetation type disturbance would result from construction of the tailings pond. Minor disturbances to the big sagebrush and mixed shrub communities would also occur. No disturbance of the winterfat type would result from construction activities.

Assuming vegetation would be removed from the total proposed areas of construction, production losses would range from approximately 34,407 to 116,172 pounds of air-dry herbage each year for the 12 year life of the project. This range corresponds to normal and good production years, respectively. Assuming an average of 12 acres/AUM, productivity losses would equal 30 AUMs/year.

Installation of water pipelines and associated access road would affect 17, 30, and 12 acres for the South Wellfield, Graben, and Kelly Wells pipelines, respectively. The Kelly Wells pipeline would not require an access road for most of its route. Disturbed areas for the pipeline trench would be reseeded immediately following construction, and plant cover and productivity would gradually be restored. The access road would be ripped and reseeded at the end of the project. Construction of the transmission line would disturb small areas of vegetation at tower construction sites.

TABLE 3-5

ACRES OF VEGETATION IMPACTED BY
FMC PARADISE PEAK PROJECT

Vegetation Type	Acres	Relative Percent
Greasewood	278	78
Bunchgrass	28	8
Big Sagebrush	14	4
Mixed Shrub	1	<1
Disturbed	33	10
Total	354	100

Source: ERT

Vegetation removal and associated productivity losses would be cumulative over the 12-year operations period for the project. After operations cease, vegetative cover and productivity may gradually be restored on disturbed areas, depending on the reclamation alternative selected. Under Alternative A, revegetation would rely on natural reinvasion from surrounding areas. Based on examination of existing disturbed areas in the project vicinity, natural reinvasion would not be expected to approach pre-disturbance cover levels for a long time, probably 10 years or longer. This time frame could be much longer on steep slopes and large surface areas (>1 acre). Effectively, Reclamation Alternative A would not be likely to promote a return to the existing use of the land. There are, however, abundant similar land resources in the region.

Reclamation Alternatives B and C would be more likely to promote post-mining land uses of rangeland and wildlife habitat. Storage and reapplication of soils to provide a seedbed and water-holding capacity, combined with active efforts to reseed disturbed areas, should increase the probability and rate of vegetative reestablishment. Under Alternative B, approximately 135 acres of the tailings area would be eventually restored. Under Alternative C, revegetation would be attempted on all areas except the mine pit (42 acres); remaining areas could potentially be restored for productive use as wildlife habitat and rangeland.

The planned mining operations would also result in the elimination of a population of about 300 individuals of the Eastwood milkweed (Asclepias eastwoodiana), a rare plant included on the list of candidate plants for the federal list of threatened and endangered species. Loss of the population on the Paradise Peak mine site would reduce the known locations of the species to approximately 17 sites within Nye, Lander, Lincoln, and Esmeralda Counties in Nevada. The overall consequences on the species cannot be accurately quantified since the total distribution and population levels of the plant are unknown; however, plant species would not be extirpated since it is known from 17 other sites. The Category 2 candidate status of the milkweed reflects the fact that the plant is rare but information is unavailable to adequately assess its status.

Air pollutant emissions were examined to assess potential vegetation impacts. Maximum predicted mercury levels from the processing facilities range from 1.67 $\mu g/m^2$ [0.179 parts per billion (ppb)] to 3.5 $\mu g/m^2$ (0.375 ppb). Studies indicate that mercury vapor levels in the ppb range applied over several days are necessary for plant injury to occur (Heck et al. 1970). Since the maximum projected mercury vapor levels are well below the ppb range, damage to vegetation is not expected. Fugitive dust from mining operations would also occur (Section 3.1). Dust deposition should pose only minor impacts since the effects would be highly localized.

3.7 Wildlife

The various aspects of construction and operation of the Paradise Peak Project were evaluated in consideration of known big game crucial habitat, such as wintering range; important chukar habitat; raptor nest locations; and habitat for other wildlife groups. The project would not be expected to result in major impacts to wildlife in the region.

Mining and construction of a mill site, tailings pond, and the waste rock disposal areas would result in direct disturbance to 354 acres of vegetation and wildlife habitat. The types affected would be greasewood, big sagebrush, mixed shrub, winterfat, and grassland. These habitats and the small mammal, reptile, and songbird species they support are very common in central Nevada. Habitat losses would be for the life of the project or longer depending upon the selected reclamation practices and procedures. As noted in Section 3.6 above, Reclamation Alternative C would result in the best potential for wildlife habitat restoration.

In addition to the direct impacts of habitat loss, other potential wildlife impacts include the effects of increased human activity and concerns related to uncontrolled camping during the construction phase, potential impacts of wildlife attracted to and exposed to tailings pond water, and effects of mill emissions and wastes.

Important big game use areas are well away from the project site. The mule deer is the only big game species known to occur in the immediate area, but use is sporadic and impacts of habitat loss would be minimal. Similarly, the project would not directly disturb chukar

range (except for the minor disturbance of powerline construction). Site access on County Road 89 from Gabbs would pass through an area occupied by chukar, and increased project-related traffic may result in more road kills of this gamebird, small mammal, and reptile species.

Several raptor nests have been identified in the project area (Figure 2-8). Though no nest sites would be directly disturbed by project construction, the proximity of some would require consideration of construction timing or techniques as protection measures, particularly for road, water pipeline, or transmission line construction.

Two prairie falcon nest sites and a golden eagle nest complex are situated on rocky escarpments about 1.5 miles east of County Road 89 which would be used for access to the project site from Gabbs. Because this is an existing county road and because of the distance from the road to the nests, impacts from increased traffic are not anticipated. A prairie falcon nest also occurs adjacent and to the west of County Road 89 approximately 1.5 miles north of the new proposed access road to the project site. This nest also falls within the Kelly Wells corridor being evaluated for a water supply pipeline. Pipeline construction of the Kelly Wells alternative during the nesting season (February 15 to August 1) would probably result in nest abandonment because of the proximity of the nest to the pipeline route. Project-related road realignment or increased traffic may also affect the use of that nest site and could possibly result in abandonment. An active golden eagle nest is located immediately west of the project site, about 1.5 miles from the ore body on a west-facing escarpment. Because of the distance from the development and the orientation of the nest away from the activity, impacts are not expected. The proposed 120 kV transmission line would pass near (approximately 0.5 mile) a prairie falcon nest (Figure 2-8). Based on preliminary alignment information, impacts to that nest are not expected.

The proposed wood pole, H-frame power line structures would not pose an electrocution threat to raptors due to conductor spacing (Sierra Pacific Power Company 1984). Similarly, all electric distribution lines in the mine/mill complex would be constructed according to specifications (Miller et al. 1975) that reduce the possibility of electrocution of raptorial birds.

The project would generate increased traffic, noise, and human activity in its vicinity resulting in unquantified increases in wildlife road kills, legal and illegal hunting and shooting, harassment, and other disturbance. Concerns of these impacts are highest where construction workers camp on public lands. Because of the shortage of available housing in Gabbs, Hawthorne, and other nearby communities (Section 3.11), the likelihood of uncontrolled camping by a large number of workers is high. Campers tend to locate near springs, trees, and rock outcrops, the same situations in the desert environment of the project area that have special value as wildlife habitat. Willow Springs, approximately 2.5 miles northeast of the site, would be an attractive area to camping construction workers; the area is also high-density chukar range (Figure 2-7) and valuable as a source of water for much of the local wildlife population.

Chemical tests of the tailings materials indicate the liquid portions of the tailings would have high levels of residual cyanide that would be harmful to wildlife. Potential exposure of wildlife to tailings materials would be limited by installation of a 7-foot high anchor fence designed to limit wildlife access and by the sparse wildlife populations on the site. However, small animals and birds could be attracted to the pond and be killed by contacting or ingesting the tailings liquor. The extent to which this impact may occur is unknown. Proposed guidelines of the Nevada Department of Wildlife would require FMC to monitor and report wildlife losses at the Paradise Peak Project so that corrective actions could be implemented if necessary.

3.8 Land Use, Recreation, and Wilderness

The proposed Paradise Peak Project would be consistent with BLM land management policies and with the Nye County General Land Use Plan which recognizes mining as the best use of much of the land in the county. The development would alter land use at the mine/mill site, however, as approximately 354 acres would be converted from wildlife habitat and rangeland uses to industrial land. The land use conversion would last for the 12-year operational period and beyond, depending on the reclamation alternative selected. As identified in Sections 3.5 and 3.6, Reclamation Alternative A would result in a low potential for

vegetation establishment and subsequent return to the current land use. More intense reclamation efforts described for Alternatives B, and especially C, would promote vegetative reestablishment on disturbed areas and postmining land use for livestock grazing and wildlife habitat.

The Proposed Project would not impact recreation or wilderness. There are no special recreational features in the mine/mill area. The site is typical of central Nevada and has received very little recreation use in the past. The Gabbs Valley Wilderness Study Area would not be affected by the 120 kV electric transmission line.

3.9 Cultural Resources

The evaluation of cultural resource impacts of the Paradise Peak Project was completed by Archaeological Research Services (ARS) (1984b, c, d, and e). Based on FMC's proposed plan of operations for the Paradise Peak Project, ARS determined that seven cultural resource sites would be directly impacted by construction or operation at the proposed mine/mill site. These are a small rock-shelter (26NY4358), two large lithic scatters (26NY4354 and 4014), and four sites of single artifacts (26NY4359, 4368, 4373, and 4361). Except for the four isolated artifacts (flakes or small tools similar to those found at larger sites in the area), ARS indicated additional data recovery was required to evaluate the archaeological significance of the sites.

Other sites in the project area were considered potentially subject to secondary impacts of erosion, additional surface disturbance, or artifact collection due to increased activity in the vicinity. These included a large rockshelter (26NY4360), nine lithic scatters, and numerous isolated finds similar to those referred to above. Two of these sites were judged by archaeologists from the BLM and the Nevada Division of Historic Preservation and Archeology (NDHPA) to be at risk of secondary impact. The shelter is a prominent local geographical feature and like one of the lithic scatters (26NY4371), is associated with numerous tools that are vulnerable to artifact collecting. Further evaluation of the archaeological significance of these two sites was recommended. Other sites recorded in the project area were judged to be at relatively little risk of impact or of relatively minor scientific significance.

In addition to the sites noted above, two small lithic scatters occur on the proposed transmission line right-of-way. The two sites would be spanned by the powerline structures and would not be directly impacted. Additional cultural sites along the right-of-way were either mitigated by surface collection during the cultural resources inventory or are sites on the mine/mill property discussed above (Sierra Pacific Power Company 1984a).

FMC, ARS, BLM, and the NDHPA agreed to a program to test and evaluate the cultural resource sites discussed above. This program was completed during the public review period for the draft EA. Results of the program were that all sites except the large rockshelter were considered ineligible for the National Register of Historic Places and no additional work would be required to prevent significant impacts. The large rockshelter (26NY4360) was judged to be a significant site and eligible for the National Register. This site would not be directly impacted by the proposed project. BLM, FMC, and the NDHPA have agreed to develop a long-term management plan to protect the site from significant impact.

3.10 Visual Resources

Visual resources of the Paradise Peak Project site are not a highly sensitive issue area because the site is visually isolated from areas of high human activity and because the scenic quality of the site is undistinguished. This is reflected in the BLM VRM Class IV rating for the area. The visual effects of developing the Proposed Project were evaluated using the Visual Resource Contrast Rating methodology of the VRM system (BLM Manual 8431), measuring the effects against the requirements for Class IV areas (see Appendix A). The project was evaluated from two observation points, approaching the site on Highway 89 from the north and from the southeast. The Proposed Project would meet the required contrast standards for Class IV areas without mitigating measures or design changes. In VRM system terminology, the project would "attract attention" but would not "dominate the characteristic landscape".

A key consideration for the visual analysis and contrast evaluation is relative scale. The Proposed Project, although sizable, would be dominated by the much higher and larger natural terrain features that intermix with the project components and provide a backdrop for viewers from Highway 89.

The waste dumps and tailings dam would stand out because of strong color contrast. The form and line contrast of these major components, despite their unnatural geometry, would be moderate to weak because of the scale differences and because they would be at least ½ mile from viewers.

In summary, the project should meet the minimum standards of the VRM Class IV area even during the worst-case period while the mine and mill are most active. After abandonment the visual contrast between the project and the natural setting would recede somewhat as natural processes of weathering and revegetation gradually occur.

The visual resources impact analysis for the 120 kV electric transmission line was completed by the BLM Carson City District Office. The majority of the proposed alignment would meet the visual contrast standards for Class IV areas without mitigating measures or design changes. The 5-mile section of the alignment crossing the Gabbs Valley Range would exceed the visual contrast standards for Class III areas. However, the expected visual contrasts would be small in comparison with the existing visual contrasts created by surface mining activities near Highway 361; thus the projected impacts of the transmission line would be acceptable without mitigating measures or design changes.

3.11 Socioeconomics

This section evaluates the beneficial and adverse effects of the proposed Paradise Peak Project within the context of cumulative social and economic changes in the study area. The project-related impacts, both temporary and permanent, cannot be treated in isolation, but must be related to changes in the overall economic picture of the area, including the layoffs occurring at C. E. Basic, the slowdown at the HAAP, and increased mining exploration throughout the area. Cumulative effects may compound or offset one another and these effects may vary

through different phases of development. The impact assessment presented here is based on the most current available information as of July 1984; future changes in employment and phasing of other projects may result in changes to the cumulative impacts presented.

The methodologies and assumptions used to develop these projections are documented in the Socioeconomic Technical Memorandum. Calculations were based on known characteristics of the study area, supported by professional planning standards, and empirical data from other mining projects in Nevada.

3.11.1 Population

Mineral County has experienced declining population levels since 1971; this trend is expected to continue at a slower rate to the year 2000 (Bureau of Business and Economic Research, University of Nevada 1983). Baseline population in the county is expected to decline to 6,180 by the year 1990, a 0.6 percent decrease from the 1980 census figure of 6,217. This projection is due primarily to the uncertainty of employment at the HAAP and mines in the area. Hawthorne, Mina, and Luning populations are represented by the decline in Mineral County.

Nye County population has continued to increase over the period from 1980 to 1983, showing a net change of 71.2 percent. Population in 1983 is estimated at 15,490. This trend is expected to continue with total population reaching 34,790 by 1990. The large growth in population is due to anticipated increases in military and mining activity in the northern part of the county and services expansion in the south. Gabbs, however, is experiencing a decline in population due to layoffs at C. E. Basic. Whether this trend will continue into the future is unknown.

Population increases resulting from the Paradise Peak Project are summarized on Tables 3-6, 3-7, and 3-8. The impact of the Paradise Peak Project on future county population levels would vary between construction and operation phases and would depend on the specific labor needs of the development and the availability of local labor. Tables 3-7 and 3-8 reflect these unknowns by providing both a "low" estimate of population increase and a "high" estimate.

TABLE 3-6

PROJECT-RELATED HOUSEHOLD AND POPULATION INCREASES BY COMMUNITY
CONSTRUCTION PHASE 1985

	Total Households	Single Households[5]	Married Households		Total Population Increase	Children in Households					
			Number[6]	Persons[7]		Total[8]	Age 0-4	Age 5-11	Age 12-14	Age 15-17	Age 18+
Regional Total	93	37	56	129	166	17	5	5	2	2	3
Hawthorne	65	26	39	90	116	12	4	4	1	1	2
Gabbs	14	6	8	18	24	3	1	1	0	0	1
Mina	9	3	6	12	15	2	0	0	1	1	0
Luning	2	1	1	3	4	0	0	0	0	0	0
Fallon	2	1	1	3	4	0	0	0	0	0	0
Tonopah	1	0	1	3	3	0	0	0	0	0	0

[1]The construction workforce is assumed to be 60 percent local, 40 percent non-local. Local workers will commute to and from their permanent place of residence to work on a daily basis.

[2]Indirect construction employment was calculated using a construction employment multiplier of 1.2 (Bureau of Economic Analysis 1980, ERT 1981).

[3]It is assumed that 70 percent of the indirect labor force are second persons in the direct labor households.

[4]Household allocation to the study area communities is illustrated in Section 3.1.1.

[5]Single households (single or married without family present) represent 40 percent of total households (Murdock and Leistritz 1979).

[6]Married households (with family present) represent 60 percent of total households (Murdock and Leistritz 1979).

[7]Average married household size is 2.3 (Murdock and Leistritz 1979).

[8]Age distribution of immigrant children: 0-4 years = 3 percent; 5-11 years = 30 percent; 12-14 years = 10 percent; 15-17 years = 10 percent; 18+ years = 20 percent (Murdock and Leistritz 1979).

TABLE 3-7

PROJECT-RELATED HOUSEHOLD AND POPULATION INCREASES BY COMMUNITY
OPERATION PHASE - LOW SCENARIO

	Total Households	Single Households[5]	Married Households		Total Population Increase	Children in Households					
			Number[6]	Persons[7]		Total[8]	Age 0-4	Age 5-11	Age 12-14	Age 15-17	Age 18+
Regional Total	96	19	77	275	294	122	37	37	12	12	24
Hawthorne	78	16	63	225	241	100	30	30	10	10	20
Gabbs	10	2	7	27	29	12	4	4	1	1	2
Mina	4	1	3	11	12	6	1	1	1	1	2
Luning	0	0	0	0	0	0	0	0	0	0	0
Fallon	2	0	2	6	6	2	1	1	0	0	0
Tonopah	2	0	2	6	6	2	1	1	0	0	0

[1]The operations workforce is assumed to be 60 percent local for the low scenario.

[2]Indirect operations employment was calculated using an employment multiplier of 1.65 derived from the Nevada Bureau of Mines and Geology special publication "An Analysis of the Economic Impact of the Mining Industry on Nevada's Economy" (1982).

[3]It was assumed that 70 percent of the indirect labor force are second persons in the direct labor households.

[4]Household allocation to the study area communities is illustrated in Section 3.1.1.

[5]Single households (single or married without family present) represent 40 percent of total households (Murdock and Leistritz 1979).

[6]Married households (with family present) represent 60 percent of total households (Murdock and Leistritz 1979).

[7]Average married household size is 2.3 (Murdock and Leistritz 1979).

[8]Age distribution of immigrant children: 0-4 years = 3 percent; 5-11 years = 30 percent; 12-14 years = 10 percent; 15-17 years = 10 percent; 18+ years = 20 percent (Murdock and Leistritz 1979).

TABLE 3-8

PROJECT-RELATED HOUSEHOLD AND POPULATION INCREASES BY COMMUNITY
OPERATION PHASE - HIGH SCENARIO

	Total Households	Single Households[5]	Married Households		Total Population Increase	Children in Households					
			Number[6]	Persons[7]		Total[8]	Age 0-4	Age 5-11	Age 12-14	Age 15-17	Age 18+
Regional Total	143	30	115	413	443	184	55	55	18	18	38
Hawthorne	118	24	94	339	363	151	45	45	15	15	31
Gabbs	14	3	11	41	44	18	6	6	2	2	2
Mina	6	1	6	17	18	7	2	2	1	1	1
Luning	0	0	0	0	0	0	0	0	0	0	0
Fallon	3	1	2	8	9	4	1	1	0	0	2
Tonopah	2	1	2	8	9	4	1	1	0	0	2

[1]The operations workforce is assumed to be 40 percent local for the high scenario.

[2]Indirect operations employment was calculated using an employment multiplier of 1.65 derived from the Nevada Bureau of Mines and Geology special publication "An Analysis of the Economic Impact of the Mining Industry on Nevada's Economy" (1982).

[3]It was assumed that 70 percent of the indirect labor force are second persons in the direct labor households.

[4]Household allocation to the study area communities is illustrated in Section 3.1.1.

[5]Single households (single or married without family present) represent 40 percent of total households (Murdock and Leistritz 1979).

[6]Married households (with family present) represent 60 percent of total households (Murdock and Leistritz 1979).

[7]Average married household size is 2.3 (Murdock and Leistritz 1979).

[8]Age distribution of immigrant children: 0-4 years = 3 percent; 5-11 years = 30 percent; 12-14 years = 10 percent; 15-17 years = 10 percent; 18+ years = 20 percent (Murdock and Leistritz 1979).

Construction is scheduled to begin in January 1985 and continue until completion in May 1986 with peak periods projected to occur during September, October, and November of 1985. The greatest population impact on Mineral and Nye Counties would occur during this period.

The effect of the Proposed Project on the area population depends largely on the number of immigrating workers and demographic characteristics of their families. As illustrated in Tables 3-6, 3-7, and 3-8, the total expected increase in population in the area from the Paradise Peak project is projected to be 166 persons during construction in 1985 and between 294 and 443 persons during operations from 1986 through 1998.

This population increase represents a modest growth in area population during construction. The average population increase during the period would be 2.2 percent of the 1980 base population in Mineral County and 0.2 percent of the 1980 population in Nye County. The low scenario population increases from operations for Mineral and Nye Counties respectively would be 4.1 percent and 0.4 percent of 1980 base populations. Comparable high scenario figures would be 6.1 percent and 0.6 percent of 1980 base populations. These figures are somewhat larger than the population increases from construction but still at a moderate level, even for the high scenario estimate.

Hawthorne population is projected to increase by 116 during construction, a 3 percent increase, and between 241 (6 percent) and 363 (10 percent) during operations. Gabbs would experience between 4 and 6 percent growth during construction and operations. Luning, Mina, Tonopah, and Fallon would experience only slight increases in population.

The permanent new population is expected to locate primarily in the town of Hawthorne as explained in Section 2.11. The allocation percentages to regional communities for both construction and operation are shown below:

Community	Construction Phase (%)	Operations Phase (%)
Hawthorne	70	82
Gabbs	15	10
Mina	10	4
Luning	2	0
Fallon	2	2
Tonopah	1	2

In summary, population increases due to the Paradise Peak Project would not greatly increase the area population, but would have a noticeable effect.

FMC estimates the Paradise Peak Project would be completed in 1998. At this time, if no additional economic activity is occurring in mining or related fields in Mineral or Nye Counties, people directly or indirectly employed by the project would be expected to leave the area. The loss of population at project completion would be comparable to the projected population increases shown in Tables 3-6, 3-7, and 3-8.

3.11.2 Economy

The principal effects of development of the Paradise Peak Project would be to increase mining employment (by place of work) in Nye County. Although the mine is located in Nye County, the majority of population is expected to live in Mineral County; therefore, the majority of service and trade sector growth would occur in Mineral County. The 200 permanent employees at the mine would represent a 17.5 percent increase in the estimated 1984 mining employment in Nye County and 2 percent increase in total wage and salary employment. The 52 to 78 additional indirect jobs would represent a 3 to 5 percent increase in employment in the services and trade sector in Mineral County and 2 to 3 percent increase in total wage and salary employment.

3.11.3 Employment

Employment impacts of the Proposed Project are summarized on Table 3-9. The greatest impact on Nye County employment from the Paradise Peak Project would be during the peak construction phase with an estimated total employment of 350. This employment would be sustained for only three months.

Based on existing state labor force and unemployment figures for Mineral, Nye, and Churchill Counties, it is estimated that 60 percent (132) of the average construction employment level of 220 workers would come from in or near the study area (Table 3-10). Immigrant labor would come primarily from other areas around the state including Reno, Carson City, Las Vegas, and Ely.

TABLE 3-9

TOTAL PROJECTED EMPLOYMENT INCREASES BY YEAR FROM THE PARADISE PEAK PROJECT

	Average Annual Employment		Total Indirect Employment			Total Direct and Indirect Employment			Non-Local Employment			Local Employment		
	Construction[1] Temporary	Operations Total	Construction[2] Temporary	Operations[3] Low[4]	High[4]	Construction Temporary[5]	Operations Low	High	Construction Temporary	Operations Low	High	Construction Temporary	Operations Low	High
1985	235		19			254			100			154		
1986	167	200	13	52	78	180	252	278	71	96	143	109	156	135
1990		200		52	78		252	278		96	143		156	135
1998		200		52	78		256	278		96	143		156	135

[1]The average construction workforce is 220 over the 16-month construction period. The peak workforce (not shown) of 350 is projected to be at the site for 3 months starting in September of 1985. This workforce will add an additional 52 direct non-local workers to the area.

[2]Indirect construction employment is calculated using a construction employment multiplier of 1.2 derived from the Socioeconomic Technical Memorandum for the Borealis project based on 1978 employment locations quotients and basic/nonbasic employment. It is assumed that 70 percent of the indirect labor force are second persons in the direct labor households.

[3]Indirect operations employment is calculated using an operations employment multiplier of 1.65 derived from Nevada Bureau of Mines and Geology (1982). It is assumed that 70 percent of the indirect labor force are second persons in the direct labor households.

[4]The low column represents an operations workforce made up of 60 percent local, 40 pecent non-local.
The high column represents an operations workforce made up of 40 percent local, 60 pecent non-local.

[5]The construction workforce is assumed to be 60 percent local, 40 percent non-local. Local workers will commute to and from their place of residence to work on a daily basis.

TABLE 3-10

PROJECT-RELATED DIRECT AND INDIRECT EMPLOYMENT BY ORIGIN

	Local Direct	Nonlocal Direct	Local Indirect	Nonlocal Indirect	Total Local	Total Non Local
Construction Phase (Average)	132	88	13	5	145	93
Operation						
Low Scenario	120	80	36	16	156	96
High Scenario	80	120	55	23	135	143

Secondary employment related to the construction of the mine/mill complex was estimated using a construction sector multiplier of 1.2 (see Socioeconomic Technical Memorandum). A high of 238 direct and indirect jobs would be created during this phase, of which 154 are projected to be filled by local area residents.

The permanent operations workforce is expected to total 200 workers, with little carryover from construction. The indirect employment generated in the service sectors during operations was estimated using an employment multiplier of 1.65, which was derived from the Nevada Bureau of Mines and Geology Special Publication, "An Analysis of the Economic Impact of the Mining Industry on Nevada's Economy" (1982) (see Socioeconomic Technical Memorandum).

The largest increase would be in 1986, when construction is winding down and operations beginning. Once construction is completed, the total employment level would range from 252 to 278 with the nonlocal portion ranging from 96 to 143 through 1998. The ranges reflect the uncertainty about future employment levels at other mining projects in the area and at the HAAP, which made it very difficult to estimate the availability of workers locally. Consequently, two scenarios were postulated for the operation phase of the project, one reflecting a low estimate of 40 percent of the workers from the local labor force (Table 3-7), and a second reflecting a high estimate of 60 percent from the local labor force (Table 3-8). The two scenarios define the bounds of a probable range of employment effects from the Paradise Peak Project. Much of the analysis following this section addresses only the high scenario as a probable worst case for effects assessment.

The employment picture for the basic industries supporting the overall economic base in both Nye and Mineral County is unclear. Future levels of activity at the C. E. Basic mine and mill in Gabbs, the Army Ammunitions Plant and the Borealis Mine, near Hawthorne, the Naval Air Station in Fallon, and the Anaconda mine in Tonopah are uncertain. The production status of each of the projects in the near future will determine the availability of local labor that could be hired by FMC.

If military expansions in Fallon and Tonopah and mineral exploration in the area continue to increase at the current rate, the unemployed labor force would be absorbed more quickly, creating the need to import more non-local labor for the Proposed Project. The high scenario would then be more likely and the local impacts would be commensurately greater.

Overall income should increase throughout the study area with reduced unemployment and increased economic activity during construction and operations. This is discussed in more detail in the Fiscal Effects Section 3.11.4.

Losses in direct and indirect employment would result upon project completion in 1998. If the economies in Mineral and Nye Counties have remained static throughout the life of the project, total employment losses could be equal to those estimated in Table 3-10.

3.11.4 Fiscal Effects

Analysis of Mineral and Nye County financial resources show that they are in sound financial condition with small but unused expenditure and bonding capacities. The proposed Paradise Peak Project would contribute a significant net revenue increase to Nye County throughout most of its projected 14-year lifespan. Revenue increases would result primarily from greater property, net proceeds, and sales tax revenues. Increasing population, however, would require greater expenditures by both Mineral and Nye Counties for the provision of services at current levels. Only a generalized analysis of the net cost/benefit to the county from the project was undertaken, however, the financial implications of the induced population growth in Mineral County should be noted.

At the county level the principal revenue change for Nye County would result from a major increase in assessed valuation attributable to the mine, mill, and other facilities. Based on a 35 percent of market value assessed valuation and a 1.89 mill tax rate, the mining company's estimated annual property taxes would be about $460,961; this is a 25

percent increase in estimated 1983 property taxes and a 6 percent increase in total revenues. About $157,580 of this would accrue to the county and the remainder to the Nye County School District and other special districts. A portion of these taxes would indirectly benefit Gabbs in the form of improved and increased county services. Assessed valuation would also rise due to new residential and commercial development. It is anticipated that most of this development would occur in the town of Hawthorne in Mineral County. As shown on Table 3-11, there would be a one-year lag between completion of the mine/mill complex and initial receipt of project-related property tax revenues by both counties due to assessment and collection practices.

The net proceeds tax is assessed on the production of gold, silver, and mercury at property tax rates. This tax is based on estimated mining profits, which depend on gold, silver, and mercury prices in the market. Tax revenues to Nye County could range between $325,942 and $567,664 if gold prices are in the range of $350-450 per ounce, silver prices $6-13 per ounce, and mercury prices between $275 and $325 per 76-pound flask.

The Paradise Peak Project would generate an annual payroll of $7,488,685 during operations (1986 through 1998). Comparable figures for 1985-86 include a construction payroll of $13,351,240. A portion of this total income would be spent in the area and would result in increased sales tax receipts, especially in Hawthorne, the primary residence for most project employees. Other sales tax receipts include corporate sales tax and contractor use taxes.

Mineral County would not share in any of the property or net proceeds tax receipts from the Paradise Peak Project. The only revenues which would be available to Mineral County would be due to secondary growth stimulated by the project, in the form of residential and commercial ad valorem taxes, sales and use tax, franchise tax, and other forms of fees and charges. The fact that no property taxes from the mine/mill complex accrue to Mineral County creates an added fiscal burden to the Town of Hawthorne and Mineral County for facilities and services because the largest portion of the immigrant population is projected to settle in Hawthorne.

TABLE 3-11

ESTIMATED CHANGES IN REVENUES AND EXPENDITURES FROM PARADISE PEAK PROJECT (CONSTANT DOLLARS)

	Estimated Revenue Change[1]				Estimated Expenditure Change[2]				Project Impact[3]			
	Mineral		Nye		Mineral		Nye		Mineral		Nye	
	Low[4] $	High[4] $	Low $	High $	Low $	High $	Low $	High $	Low $	High $	Low $	High $
1985					72,216	72,216	16,308	16,308	(72,216)	(72,216)	(16,308)	(16,308)
1986	65,746	65,746	14,580	14,580	112,497	156,656	19,334	26,510	(46,751)	(90,910)	(4,754)	(11,930)
1987	102,347	142,514	693,368	858,963	134,343	201,249	21,140	31,408	(31,996)	(58,735)	672,228	827,555
1988[5]	122,199	183,057	799,404	1,050,306	134,343	201,249	21,140	31,408	(12,144)	(18,192)	778,264	1,018,898

[1]Estimated revenues are based on projected property ($460,961) and net proceeds ($351,894 - $593-616) tax receipts (or a portion of) for mine and mill operations in Nye County and average per capita revenue (Fiscal year 1983 - 1985) applied to induce project population in Nye ($540) and Mineral ($483) counties. No revenue is projected to be received the first year because of the lag in production and initial tax receipts.

[2]Estimated expenditures are based on average per capita expenditures (Fiscal year 1983 - 1985) applied to induced project population in Nye ($604) and Mineral ($531) counties.

[3]Projected impact = estimated revenues - estimated expenditures.

[4]High and low estimates represent the range of population impacts; 40 percent non-local; 60 percent non-local and the variable market prices of gold, silver, and mercury.

[5]1989 through 1999 revenues will decrease slightly due to depreciation of property and equipment.

An average 3-year (1983-1985) per capita estimate was utilized to estimate revenues in the financial analysis. Per capita revenues were slightly lower than per capita expenditures, and therefore would show a net deficit in Mineral County throughout the period. Per capita revenues for Mineral County are estimated at $483 and $540 for Nye County.

Nye and Mineral Counties' operating expenditures would also be affected by the Proposed Project. A simplified approach to determining increased operating expenditures is to examine the current per capita county expenditures and multiply this amount by the project-related new population. For this analysis, a continuation of average (1983-1985) per capita spending of $521 in Mineral County and $604 in Nye County was assumed.

When projected revenues and expenditures were compared, an estimate of the net fiscal impact to Mineral and Nye Counties resulted. Table 3-11 shows projected expenditures, revenues, and the net fiscal balances for 1985-1988. Mineral and Nye Counties show a negative fiscal impact in both 1985 and 1986. Nye County would quickly recoup these losses with the first year property and net proceeds tax receipts. In Nye County and Gabbs, the resulting increase in revenues from property taxes and net proceeds taxes (which are not limited under the state-imposed revenue cap) would likely improve the quality and quantity of services in Nye County and Gabbs without substantial population related increases in service demands. Given this situation, the county could reduce non-property taxes or lower the ad valorem levy.

Mineral County, however, would continue to show a net deficit throughout the life of the mine if existing levels of service and revenue rates are maintained into the future. For Mineral County this may mean a reduction in the quality of services provided, or a request for an increase in the property tax rate necessary to cover projected expenditures.

In summary, the FMC development would result in a net beneficial effect on Nye County finances once tax revenues of the project start accruing to the county. Mineral County, however, would experience a net negative fiscal impact which would have an impact on the existing levels of services and possibly on tax rates and other charges.

Upon project completion, the financial conditions existing prior to project start-up could occur if economic activity in Mineral and Nye Counties, other than the Paradise Peak Project, have remained static from 1986 to 1998. Nye County would experience significant reduction in ad valorem revenues from mine and mill operations after mine closure. The net negative fiscal impact in Mineral County would decline as workers moved out of the area.

3.11.5 Housing

The provision of adequate housing during both the construction and operation phases of the Paradise Peak Project would be a principal concern. As was described earlier, the existing housing market is generally very tight for lower cost and temporary housing alternatives, such as rentals and mobile homes, throughout the study area. Future prospects for a change in this situation depend on new development of residential, multi-family rental units, these are difficult to project. Continuing uncertainty about HAAP employment and mining activity in the region has been and will be a hindrance to private development of rental housing units. Efforts by FMC to encourage private development may spur an increase in the housing supply. Because these effects are unpredictable at this time, for this analysis it was assumed that there will be no large change in the baseline housing supply. Thus, the housing analysis constitutes a worst-case analysis.

The Paradise Peak Project is expected to create a total of 93 new construction-related households by 1985, and between 96 to 143 project-related households during operations (Tables 3-6, 3-7, 3-8). The existing housing stock in the area including vacancy rates, rental rates, houses for sale, and temporary accommodations is illustrated in Chapter 2. Assuming the housing stock remains at the current level there would be an unmet demand for additional housing during both the construction and operations phases. Assuming all of the vacant housing stock and the vacant motel units were available to the immigrant population, the remaining project-related housing demand would range from 26 to 79 units greater than the available supply, as shown on Table 3-12.

TABLE 3-12

EXISTING HOUSING SUPPLY AND ESTIMATED PROJECT-RELATED IMPACTS: HAWTHORNE

	Existing Supply		Project-Related Demand	Supply Surplus/ <Deficit>
	Rental Units	Motels		
Construction Phase				
Average	34	27	93	<32>
Peak	34	27	140	<79>

	Existing Supply		Project-Related Demand		Supply Surplus/ <Deficit>	
	For Sale	For Rent	Low	High	Low	High
Operations Phase						
	36	34	96	143	<26>	<73>

Source: Hawthorne Chamber of Commerce 1984; personal communication with local real estate representatives.

There is an abundance of developable land in the Hawthorne area, but several constraints exist for developers including: the unavailability of construction financing, the risk associated with developing in an unstable economic setting such as Hawthorne, the uncertain water supply situation in Gabbs, and the relatively short life of the project.

A shortage of housing such as the one projected for Hawthorne, creates several related problems if not resolved in a timely manner. Overcrowding in units that are available may cause worker dissatisfaction and high employment turnover rates that are both expensive and potentially socially disruptive. Construction workers, in particular, may camp randomly in the project area creating conflicts with private land owners and occupancy trespass problems for federal land managers.

Housing in other communities and in Churchill County is projected to be adequate to accommodate the limited population growth they would experience from the Paradise Peak Project.

After the project is completed vacancy rates in both Hawthorne and Gabbs would probably increase, unless there is an unmet housing demand associated with other economic activity in the area in 1998. Potential vacancies in the study area would range from 96 to 143 units.

3.11.6 Public Facilities and Services

Public facilities and services in the study area have adequate design capacity and staffing levels to accommodate project-related growth, with a few exceptions. The City of Gabbs is under a state-imposed water moratorium and cannot expand the number of existing water service hookups until fluoride levels in its water are reduced (Rasner 1984, personal communication). No known proposals have been developed to correct drinking water quality so the city's water system would limit the amount of growth it can accommodate. If this were not the case, it is expected that Gabbs would experience considerably more growth due to its proximity to the mine site.

A substantial temporary influx of persons into the communities of Gabbs, Mina, and Hawthorne looking for employment at the mine is expected when project construction begins. This is projected to place a temporary burden on local law enforcement and social service agencies

because the number of transients may exceed the employment available and many may lack the resources to settle in the area or even to move to other areas. In addition, the immigration of population associated with the project workforce during both construction and operations would impact law enforcement services. Utilizing a planning standard of 2 officers per 1,000 new population results in a project-related need of 1 new officer. Even with one additional patrolman, work loads in the Sheriff's Department would increase, especially during the construction startup period. The City of Gabbs police force would undergo a caseload increase, but no new staffing should be required.

Social service providers, especially the Consolidated Agency for Human Services (CAHS) would experience substantially increased caseloads and financial demands during the construction and operations startup period due to the immigration of transients looking for employment. Staffing levels appear to be adequate, but financial resources of CAHS are limited and would be strained. After mine operation is underway, no adverse public service impacts are expected.

3.12 Recommended Mitigation and Monitoring Measures

This section lists possible mitigation and monitoring measures. The measures are designed to: 1) minimize adverse impacts identified in previous sections, 2) provide additional design standards for FMC to consider in final engineering, and 3) meet the anticipated requirements of state and federal permits. Included are specific measures that may be implemented by FMC and measures that would be implemented by BLM or affected counties or communities.

3.12.1 Air Resources

Measure 1: Measures to control air pollutant emissions are included in the design of the proposed mine and processing facilities. Continued air quality monitoring may be required under the provisions of the permit issued by Nevada Division of Environmental Protection.

3.12.2 Geology and Mineral Resources

Measure 1: The design of the tailings dam will be in accordance with Nevada regulations and approved by the Nevada State Engineer's Office.

Measure 2: Current plans call for waste dump slopes to be left at the angle of repose (37°) on abandonment. It is recommended that the stability of these slopes be further evaluated, and if necessary, slopes on waste rock piles be graded or deposited to a maximum steepness of 26.6° (2:1) to reduce potential instability.

3.12.3 Water Resources

Groundwater

Measure 1: Because of the uncertainty associated with the analysis of effects of groundwater pumping, FMC should monitor for drawdown effects in wells currently being used within 3 miles of the water supply production well(s). If adverse effects on existing water users are demonstrated, FMC should provide monetary reimbursement or an alternative water supply to the affected party.

Measure 2: A groundwater monitoring system should be designed and implemented for the tailings impoundment in accordance with requirements of the Water Pollution Control Permit issued by the Nevada Division of Environmental Protection.

Surface Water

Measure 1: The tailings dam should be sized to contain the flood volume resulting from the 6-hour probable maximum precipitation. This measure would significantly minimize the probability of tailings dam failure and/or the uncontrolled release of tailings materials.

3.12.4 Soils

Measure 1: There remain uncertainties regarding: 1) the extent of the apparent conflict between topsoil salvage and construction material requirements in the tailings impoundment area, 2) the rate and eventual success of natural reinvasion and 3) the possible use of waste rock or other topsoil substitutes for reclamation under Alternatives B and C. Because of these uncertainties, BLM and FMC should consider designing an experimental revegetation program to develop cost-effective, site-specific measures to aid future reclamation decisions.

3.12.5 Vegetation

Measure 1: Informal consultation was completed with the U.S. Fish and Wildlife Service to identify possible measures for mitigating the impacts to the on-site population of the rare plant Asclepias eastwoodiana. It is recommended that experimental propagation or transplanting be attempted by FMC to try to establish a new population in an area of similar habitat that would not be disturbed by mining. A monitoring design and vegetative study site would be established by FMC and monitoring would be conducted by BLM according to the Tonopah Resource Area Rangeland Monitoring Plan. Results would be reported to the Fish and Wildlife Service, Nevada State Museum, and other interested agencies.

Measure 2: Short-term disturbance of vegetation is an unavoidable consequence of the mining development. Long-term loss of vegetative cover and productivity should be mitigated by implementing reclamation and revegetation practices on disturbed areas.

3.12.6 Wildlife

Measure 1: BLM and FMC should consult with the Nevada Department of Wildlife to develop controls or access restriction within 0.5 mile of known raptor nests and the Willow Springs area. This measure would reduce the project-related impact to wildlife of construction worker camping on public lands.

Measure 2: Wildlife use of the tailings pond should be monitored and mortality reported, in accordance with Nevada Department of Wildlife requirements. If mortality is judged excessive by NDOW and BLM, FMC should develop two wildlife guzzlers in an unaffected area to provide an alternative water supply and partially offset the wildlife losses.

3.12.7 Cultural Resources

Measure 1: A long range management program should be developed to provide for the protection of the large rock shelter, site 26NY4360. The program should be developed by FMC, BLM, and NDHPA to ensure no significant impact to the site.

3.12.8 Visual Resources

Measure 1: Although the visual effects would not be considered significant, actions could be taken that would further reduce visual contrast such as contouring the waste dumps during reclamation to more closely approximate natural slopes and topographic features. Selecting colors to blend with the natural environment would also reduce the visibility of the processing plant.

3.12.9 Socioeconomics

Measure 1: Provision of current project information to local governments is a critical mitigating factor to enable planning agencies to respond effectively to projected changes in housing and demand for public facilities and services. FMC should continue to work with affected communities and should provide current estimates on employment, project startup and completion dates, and company housing policies to county officials.

Measure 2: The projected shortage of housing during the construction phase could lead to prolonged camping or "occupancy trespass" on public lands. FMC should attempt to limit this occurrence by working with federal land managers and county officials.

Measure 3: Housing impact would be most severe in Hawthorne. Shortfalls during both construction and operation would be primarily for rental housing. FMC should continue to monitor the housing situation to determine whether company housing policies should be adopted.

Possible options for minimizing housing shortages during construction include the following:

- FMC could encourage contractors to provide transportation for immigrant construction workers to and from areas such as Fallon, where workers can be accommodated.
- FMC could encourage private development of temporary accommodations for construction workers near the worksite by locating mobile homes on existing mobile home lots in nearby communities.
- FMC could encourage private development of campgrounds/trailer parks that would have public services to accommodate construction worker mobile homes and recreational vehicles.

Measure 4: Housing shortages are projected to continue through the operations phase of the project. FMC should continue to monitor the housing situation and encourage permanent housing construction by private developers.

Measure 5: In order to help counter the projected fiscal imbalance in Mineral County, the county could request supplemental funds from the state county/city relief tax reserve funds to cover increased expenditures for the induced population. If the request was granted by the state, it would increase revenues to the Mineral County budget for increased expenditures caused by immigrating population.

3.13 Summary and Comparison of Alternatives

This final section of Chapter 3 has two objectives. First, in Section 3.13.1, the conclusions reached in previous sections are summarized and the impacts are placed in context according to several criteria which the NEPA regulations require to be considered in an Environmental Assessment. Second, in Section 3.13.2 the alternatives

considered in the assessment are compared so the reader may understand their overall consequences. The comparison of impacts relies greatly on the summary presented in Section 3.13.1 because most of the alternatives considered would affect only a portion of the overall proposed development.

3.13.1 Summary of Impacts

Table 3-13 summarizes the potential impacts associated with developing the proposed Paradise Peak Project. Information included in the table was derived from the analyses described for specific resources in Sections 3.1 through 3.12. Additionally, Table 3-13 provides perspective for balancing the various impact conclusions, by reviewing the impacts in terms of the following criteria:

- Is the impact considered beneficial or adverse? The terms beneficial and adverse are subjective, of course, however judgements are made regarding the overall nature of the projected change. These judgements are made in terms of the specific affected resource only.

- Is the impact avoidable or unavoidable? An avoidable impact is one that may be minimized or prevented if the recommended mitigation measures included in Section 3.12 are implemented. Certain impacts, however, would be unavoidable consequences of the proposed mine/mill development and operations.

- What is the duration of the impact? Here, short term is defined as the 14-year project life. Long-term impacts would last beyond the project life. These time frames are important in evaluating the overall tradeoffs between the short-term use of the land for mineral extraction and long-term future uses.

- Would the impact represent either an irreversible impact or an irretrievable commitment of resources?

As shown in Table 3-13, implementation of FMC Corporation's proposed Plan of Operations for the Paradise Peak Project would result in both beneficial and adverse impacts. The beneficial impacts are primarily social and economic, deriving from increases in employment opportunities, tax revenues, and economic activity resulting from the proposed development. Not all of the social impacts would be beneficial, however, as housing demand is expected to exceed supply, and

TABLE 3-13

SUMMARY OF IMPACTS OF THE PROPOSED PARADISE PEAK PROJECT

Resource/Impact	Beneficial or Adverse	Unavoidable	Short-Term	Long-Term	Irreversible or Irretrievable	Mitigation Measures Identified
Air Resources						
Increased particulate matter emissions	A	Yes	Yes	No	No	Yes
Mercury emissions	A	Yes	Yes	No	No	Yes
Geology and Mineral Resources						
Potential creation of unstable slopes	A	No	No	Yes	No	Yes
Extraction of gold, silver, and mercury	B	Yes	Yes	Yes	Yes	No
Water Resources						
Potential impact on existing groundwater users	A	Yes	Yes	No	No	Yes
Potential local contamination of groundwater	A	No	Yes	No	No	Yes
Soils Resources						
Disturbance of 354 acres of soil resources	A	Yes	Yes	Yes[1]	No	Yes
Increased erosion on disturbed areas	A	Yes	No	Yes[1]	No	Yes
Loss of topsoil resource on non-salvaged areas	A	No[2]	Yes	Yes	Yes	No

TABLE 3-13 (CONTINUED)

Resource/Impact	Beneficial or Adverse	Unavoidable	Short-Term	Long-Term	Irreversible or Irretrievable	Mitigation Measures Identified
Vegetation						
Disturbance of 354 acres of vegetation	A	Yes	Yes	Yes[1]	No	Yes
Elimination of a population of rare plants	A	Yes	Yes	Yes	Yes	Yes
Wildlife						
Disturbance of 354 acres of wildlife habitat	A	Yes	Yes	Yes[1]	No	Yes
Increased direct and indirect mortality and harassment of wildlife	A	Yes	Yes	No	No	Yes
Disturbance of nesting prairie falcons	A	No	Yes	No	No	Yes
Land Use						
Conversion of rangeland to industrial use	B,A	Yes	Yes	No[1]	No	No
Cultural Resources						
Direct disturbance of 7 cultural sites	A	Yes	Yes	Yes	Yes	Yes
Indirect disturbance of 10+ cultural sites	A	Yes	Yes	Yes	Yes	Yes

TABLE 3-13 (CONTINUED)

Resource/Impact	Beneficial or Adverse	Unavoidable	Short-Term	Long-Term	Irreversible or Irretrievable	Mitigation Measures Identified
Visual Resources						
Create visual contrasts	A	Yes	Yes	No	No	Yes
Socioeconomics						
Increased population	B, A	Yes	Yes	No	No	No
Increased employment	B	Yes	Yes	No	No	No
Increased economic activity	B	Yes	Yes	No	No	No
Increased Nye County revenues	B	Yes	Yes	No	No	No
Increased Mineral County expenditures for services	A	Yes	Yes	No	No	Yes
Create housing shortage	A	No	Yes	No	No	Yes

[1]Duration of impact depends on the reclamation alternative selected. Alternatives B and C would shorten the impact duration and are assumed here. Alternative A would result in long-term soils, vegetation, wildlife, and land use impacts at the project site.

[2]Extent of impact depends on the reclamation alternative selected.

Mineral County and Hawthorne are expected to experience added fiscal burdens to provide facilities and services for the in-migrant population. Additional adverse impacts are associated with site-specific disturbances required to construct and operate proposed facilities.

Many of the adverse impacts summarized in Table 3-13 are unavoidable. These impacts are necessary consequences of any mining and milling operation. For example, land disturbances are required for facilities construction, particulate matter emissions cannot be completely eliminated, and groundwater pumping necessarily results in at least local drawdown. Other impacts listed in the table can be avoided or further reduced by implementing the mitigation and monitoring measures identified in Section 3.12.

Most of the impacts identified for the Paradise Peak Project would be short-term effects that would not extend beyond the project life. The conversion of rangeland/wildlife habitat to industrial use would be a long-term consequence of the mining development although the overall duration of the effect depends greatly on final decisions regarding reclamation approaches. Most disturbed lands could eventually be returned to post-mining uses as rangeland and wildlife habitat.

Finally, few of the impacts identified represent either irreversible impacts or irretrievable commitments of resources. By design, the geologic formations of the open pit mine would be irreversibly changed during mining, and the gold, silver, and mercury produced would be irretrievable once shipped to market. Such changes are the purpose of the proposed mining development. With the exception of the 42 acres of rangeland/wildlife habitat removed by mining, other land commitments would be reversible after mining operations cease and reclamation plans have been implemented. The rare plant population would be irreversibly impacted by mining. Disturbance of cultural resource sites would also be irreversible, although mitigation programs are designed to recover valuable information from the sites. Soil losses on areas where topsoil is not salvaged would be irreversible.

3.13.2 Comparison of Alternatives

Chapter 1 listed four types of alternatives to be evaluated in the EA: the No Action Alternative; three water supply alternatives; three reclamation alternatives; and a land sale alternative. These alternatives were discussed in appropriate places in the discussions for individual resources. Following paragraphs summarize the conclusions reached regarding the various alternatives, highlighting the trade-offs associated with each.

No Action Alternative. The No Action Alternative is included in the EA as required by NEPA, although BLM regulations allow BLM to reject a proposed Plan of Operations only under conditions where the proposal would violate certain federal or state laws or would result in the undue or unnecessary degradation of federal lands. The environmental analysis did not identify conditions that would constitute undue or unnecessary degradation, given environmental protection and engineering features included in the Plan of Operations and the mitigation recommendations incorporated into the EA. Violations of federal or state law appear unlikely, although several agencies must still evaluate specific design proposals and permit applications.

The No Action Alternative would preclude development of the Paradise Peak Project. Thus, the environmental impacts listed in Table 3-13 would not occur. The No Action Alternative would preclude the development of economically significant precious metals reserves and associated beneficial employment and economic consequences. Similarly, it would avoid the short-term adverse impacts associated with facilities construction and operation.

Water Supply Alternatives. FMC is evaluating three potential well fields for developing a permanent water supply for the process facilities. Based on the available information on the well fields and the analyses summarized previously, each of the alternatives appears suitable for development. The South Wellfield alternative offers advantages over the Graben and Kelly Wells alternatives: 1) it is closer and thus would require a shorter pipeline and smaller construction

disturbance area; 2) there are fewer existing water users in the vicinity so potential drawdown impacts, probably increased pump lifts, would be minimized; and 3) water quality is better than the other areas. The Kelly Wells alternative appears least desirable of the three sources because it has existing water users in proximity, the highest number of nearby existing water users, and would require construction of the pipeline within 0.5 mile of an active prairie falcon nest.

Reclamation Alternatives. The three reclamation alternatives evaluated represent a range of reclamation intensity, with Alternative A being a low level of reclamation intensity and Alternatives B and C being a high level. The major differences between approaches are that Alternative A would not include topsoil salvage and would rely on natural reinvasion for plant establishment. Alternatives B and C would include some topsoil salvage and reapplication combined with seeding of adapted plant species. Active revegetation efforts would be restricted to the 135-acre tailings area under Alternative B; revegetation would be attempted on all areas except the mine pit under Alternative C.

Important differences were identified between the reclamation approaches that affect impact conclusions under soils, vegetation, wildlife, and land use. Basically, vegetation and soils specialists concluded that revegetation of disturbed areas is possible at the Paradise Peak site if topsoil is salvaged and reapplied, seedbeds are properly prepared, and a suitable seed mixture is seeded. Areas actively revegetated could be returned to productive post-mining land use as rangeland and wildlife habitat. In contrast, natural invasion of the large disturbed areas appears unlikely under Alternative A. Productive post-mining land use would be unlikely and disturbed areas could experience locally severe erosion and slope instability.

Salvageable soil resources, shown on Figure 2-3, are sufficient to retopsoil disturbed areas to a target depth of 12 inches. Under Reclamation Alternative B, about 217,800 cubic yards of soil would be required. Under Reclamation Alternative C, about 480,000 cubic yards of soil would be required. Soils available on each component site are generally sufficient to retopsoil the same area during revegetation.

Potential conflicts were identified between topsoil salvage requirements and construction material requirements in the tailings impoundment area. If all of the topsoil suitable for salvage in the impoundment area is required for construction, a shortage of approximately 20,500 cubic yards of soil would occur under Alternative C.

The three reclamation alternatives also have important differences in terms of their economic cost. Reclamation Alternative A would be the least expensive option, B would be the next most expensive option, and C the most expensive option. Estimates of the overall costs of the three reclamation approaches are summarized in Table 3-14. These do not include the costs of building removal under any alternative. A major portion of the costs of Alternatives B and C is associated with topsoil handling. As noted previously, it may be possible to use topsoil substitutes in revegetation; however, the characteristics of the topsoil substitutes need to be evaluated before such decisions can be made.

Land Sale Alternative. Under the land sale alternative, approximately 640 acres of non-mineralized land would be purchased by FMC. This alternative would not pose major differences in impact conclusions from the proposed action because most of the proposed operations would remain the same. Minor differences in fiscal benefits to Nye County would occur as the county's assessed valuation would increase by an estimated $25,600. This increase would generate a projected increase in property taxes of $484 over those projected for the proposed action. Additionally, the proposed land sale could influence future use of the land following mining. If the land affected by proposed facilities were sold to FMC, provisions of the BLM surface management regulations would no longer apply. Thus, FMC could choose to abandon the mine and reclaim disturbed areas according to company policies and federal, state, and county regulations in force at the time.

TABLE 3-14

SUMMARY OF RECLAMATION COST ESTIMATES FOR THE MINE/MILL COMPLEX[1]

Item	Alternative A[2]	Alternative B[2]	Alternative C[2]
Grading/Shaping of Waste Dumps	$ 50,671	$ 50,617	$ 128,365
Rock Armor on Tailings Impoundment	283,995	283,995	283,995
Topsoil Salvage, Stabilization, Reapplication	NA	304,271	482,963
Revegetation (Seedbed Preparation, Seeding, Fertilizing, etc.)[3]	NA	58,275	123,807
TOTAL MINE COMPONENTS	$334,612	$697,158	$1,019,130

[1]Detailed costing is included in the Reclamation Technical Memorandum.

[2]Costs assume creation of 2:1 slopes on waste piles per the recommended mitigation measures identified under Geology and Mineral Resources; for Alternative C these slopes would be 3:1 to enable revegetation.

[3]Costs assume drill seeding with a rangeland drill.

4.0 CONSULTATION AND COORDINATION

This Environmental Assessment (EA) was prepared by Environmental Research & Technology, Inc. (ERT), of Fort Collins, Colorado with assistance from a Bureau of Land Management (BLM) interdisciplinary team. Table 4-1 provides a list of the preparers and the qualifications and responsibilities of each in the preparation of the EA.

4.1 Public Involvement

The EA for the Paradise Peak Project was prepared by ERT to BLM standards. The BLM, as the lead agency, implemented public and interagency consultation and coordination during the development of the EA and review of the Draft EA.

4.1.1 Public Scoping

Prior to development of the Draft EA, BLM completed a formal public scoping process. This process included: news releases regarding the proposed project and the EA process; mailing of scoping documents to forty agencies, organizations, and individuals; public scoping meetings in Tonopah, Gabbs, and Hawthorne; meetings with Nye and Mineral County Commissioners; and informal discussions with many local, state, and federal agencies. Excluding BLM, FMC, and ERT personnel, 106 persons attended the public meetings; 7 state agencies and the Sierra Club provided written comments during the scoping period.

The public involvement process contributed significantly to the development of the EA by providing information to the EA team and by focusing the analysis on specific issues of concern to commenters. Issues raised during the scoping process fell into ten general categories, summarized below:

- General. The Nevada Department of Minerals and many local residents expressed general support for the proposed Paradise Peak Development, citing the economic importance of mining in the region and the positive economic and employment effects anticipated to result from the development. Commenters expressed support for the EA preparation process, noting that the EA should be used to develop mitigation measures, as needed to limit potential adverse effects associated with the development.

TABLE 4-1
LIST OF PREPARERS

Name	Education/Experience	Responsibility
Bureau of Land Management		
Leslie A. Monroe Area Manager	B.S. Wildlife Management M.S. Natural Resource Management 14 Years Professional Experience	Authorized Officer
Larry Trease Technical Specialist	B.S. Geology 17 Years Professional Experience	Project Manager for BLM
Mike Ford Technical Specialist	B.S. Wildlife Management 6 Years Professional Experience	Wildlife, Threatened and Endangered Species
Dave Squires Technical Specialist	B.S. Range and Wildlife Management 8 Years Professional Experience	Vegetation, Range, Livestock
Jon Joseph Technical Specialist	B.A. Recreational Administration 6 Years Professional Experience	Project Coordinator
Dave Loomis Technical Specialist	B.A. (Economics) 7 Years Professional Experience	Socioeconomics
Bob Crabtree Technical Specialist	B.A. Anthropology M.A. Anthropology 35 Years Professional Experience	Cultural Resources
Environmental Research & Technology, Inc.		
Russell T. Moore Project Manager	Ph.D. (Ecology) B.S. (Range Management) 13 Years Professional Experience	Project Manager, Overall Project Direction, Agency Liaison, and Quality Review
Thomas G. Shoemaker Assistant Project Manager EA Manager	M.S. Candidate (Wildlife Ecology & Resource Planning) B.S. (Biology and English) 7 Years Professional Experience	EA Manager, Coordination, Planning, Quality Review, Agency Liaison
Sophie Sawyer Project Coordinator	M.Ed. (Science Education) B.A. (Biology) 5 Years Professional Experience	Coordination and Editing of EA
Howard Gebhart Discipline Manager	M.S. (Meteorology) B.S. (Professional Meteorology) 9 Years Professional Experience	Air Resources Discipline Manager
Mary-Jo Bohmert Technical Specialist	B.S. (Environmental Engineering) 1 Year Professional Experience	Air Resources

TABLE 4-1 (CONTINUED)

Name	Education/Experience	Responsibility
Richard Spotts Discipline Manager	Graduate Study (Hydrology) B.S. (Civil Engineering) B.S. Candidate (Physical Science) 8 Years Professional Experience	Earth Resource Discipline Manager, Water Resources
Mark Zuber Technical Specialist	M.S. (Environmental Geology) B.S. (Environmental Studies) 7 Years Professional Experience	Groundwater, Geology
James Burrell Technical Specialist	B.S. (Forest Management) Continuing Studies (Geology) 9 Years Professional Experience	Soils, Reclamation
Robert C. Sanz Discipline Manager	B.S. (Zoology) 10 Years Professional Experience	Biological Resources Discipline Manager, Wildlife
Philip Hackney Technical Specialist	M.S. Candidate (Range Ecology) B.S. (Botany) 7 Years Professional Experience	Vegetation, Reclamation
Bernhard Strom Discipline Manager	M.C.R.P. (City and Regional Planning) B.S. (Urban Planning) 13 Years Professional Experience	Human Resources Discipline Manager, Visual Resources, Cultural Resources
Jennifer Kathol Technical Specialist	B.S (Natural Resource Economics) 8 Years Professional Experience	Socioeconomics
Patrick Tierney Technical Specialist	M.S. (Resource Management) B.S. (Biology-Environmental Science) 6 Years Professional Experience	Land Use, Recreation, Transportation

- Local and Regional Communities. Many commenters noted the potential for beneficial and adverse effects on Mineral and Nye Counties and local communities. Commenters stressed the need to analyse possible effects on public financial resources, housing supply and demand, employment, and community services.

- Air Quality. The Nevada Division of Environmental Protection, Air Quality Section stated that the project would require Air Quality Registration Certificates, provided input on the impact analyses required for permit applications, and suggested pollution control devices for FMC to consider. State personnel and public meeting attendees stressed the need to evaluate potential effects of particulate and mercury emissions.

- Water Quality. The Nevada Division of Environmental Protection, Water Quality Section, and several attendees of the public meeting emphasized the need to design proposed facilities to limit accidental contamination of groundwater and to monitor potentially affected aquifers. The Division stressed the importance of the State Zero Discharge Permit as a means, in addition to the EA, of evaluating proposed pollution control and monitoring measures.

- Water Supply. Several residents of the Gabbs vicinity urged that the EA address possible impacts of groundwater pumping on existing water users. They expressed concern for continued use of existing livestock and domestic supply wells.

- Geologic Hazards. One commenter noted that the facility would be constructed in a region of high seismic risk. He stressed the need to evaluate potential earthquake occurrence in the design of proposed facilities, especially the tailings dam.

- Paleontological Resources. The Sierra Club noted the risk of direct and indirect impacts to the important paleontological resources found in the Stewart Valley.

- Wildlife. The Nevada Department of Wildlife and local residents noted the immediate area of the mine and mill site was not considered high value wildlife habitat, but urged that the EA consider potential effects on the wildlife species that do occur. Of particular interest were potential effects of water development, the transmission line, and the tailings impoundment.

- Cultural Resources. The Nevada Division of Historic Preservation and Archeology noted that the proposed project must comply with the National Historic Preservation Act of 1966, as amended, and related regulations. Affected areas require cultural resources inventory and evaluation prior to development.

- Recreation. The Nevada Division of State Parks urged the consideration of possible impacts on regional recreational opportunities, including the Berlin Icthyosaur State Park.

- Livestock Grazing. Several commenters noted that the area is currently used for livestock grazing. They urged the EA consider potential impacts on livestock grazing and grazing allotments, during and following mining.

4.1.2 Review of the Draft EA

The Draft EA was circulated to 102 federal, state, and local agencies and/or interested persons for review and comment. Letters of comment were received from FMC Corporation, the Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Mineral County Commissioners, and 10 state agencies (through the State Clearinghouse). Specific comments were used by BLM in developing the Final EA. Each letter and BLM responses to individual comments are included as Section 4.3 in this Chapter.

4.2 Lists of Agencies and Organizations Consulted

Various federal, state, and other agencies were consulted during preparation of the EA. The following agencies, groups, and individuals have provided input and/or received copies of the Draft EA.

Federal

U.S. Department of the Army
Hawthorne Army Ammunition Plant

U.S. Department of the Interior
Bureau of Indian Affairs, Nevada Indian Agency
Bureau of Land Management, Nevada State Office
Battle Mountain District Office
Carson City District Office
Fish and Wildlife Service

U.S. Environmental Protection Agency

U.S. House of Representatives
Harry Reid
Barbara Vucanovich

U.S. Senate
Chic Hecht
Paul Laxalt

State of Nevada

Department of Conservation and Natural Resources
- Division of Environmental Protection
- Division of Historic Preservation and Archaeology
- Division of State Lands
- Division of State Parks

Department of Consumer Health
Department of Minerals
Nevada State Clearinghouse
N-3 State Grazing Board
Governor Richard Bryan

County and Local

Mineral County Assessor
Mineral County Board of Commissioners
Mineral County Chamber of Commerce
Mineral County Executive Director
Mineral County Game Management Board
Mineral County Planning Commission
Mineral County Planning Consultant
Mineral County Schools Superintendent
Nye County Board of Commissioners
Nye County Planner
Mayor of Gabbs
Gabbs Police Department
Gabbs Town Council
Hawthorne Chamber of Commerce
Mina Town Board
Tonopah Public Utilities
Tonopah Town Manager
Walker River Pauite Tribal Council
Yomba Shoshone Tribe

Private Organizations

A & H Foods
Anaconda Minerals Company
B & I Enterprises
Basic Refractories
Candelaria Metals, Inc.
C.E. Basic Industries
Central Nevada Historical Society
Centennial Minerals
Combined Metals Reduction Company
Fidel's Clothing Center
Gabbs Motel
Hawthorne Realty
Isom Realty & Insurance
Keystone Club & Supply
Moors Trailer Park
Nevada Archaeological Association
Nevada Mines and Prospectors Association

Private Organizations (Continued)

Nevada Mining Association
Nevada Outdoor Recreation Association
Nevada Prospectors Association
Nevada State Journal
New Boston Mines
Paris, Paris & Inchauspe
Placer O S, Inc.
Ponte Realty
Resource Systems
Security National Bank of Nevada
Sierra Club
Sierra Pacific Power Company
Spectrum Exploration
Thompson's Auto Parts
The Argee Corporation
WEC Associates
Western Central Petro
W.H.O.A.!
Yomba Cattlemen's Association
Zimmerman Ranching Corporation

Individuals

Rae Aon, Gabbs, NV
Ed Alworth, Gabbs, NV
Stace Arnston, Tonopah, NV
JoAnn Barredo, Gabbs, NV
Bunny Barredo, Gabbs, NV
Ray Belleville, Gabbs, NV
Ella Belleville, Gabbs, NV
Hazel Brodon, Babbitt, NV
Wilfred Buffington, Luning, NV
Zoela Buffington, Luning, NV
Kathy Burke, Hawthorne, NV
James Burke, Hawthorne, NV
Patricia Butler, Gabbs, NV
Esther Chang, Reno, NV
Cheri Clendenning, Hawthorne, NV
Beatrice Collier, Hawthorne, NV
Floyd Dennis, Gabbs, NV
Daniel Donahue, Hawthorne, NV
Jack Estill, Likely, CA
P.D. Garwood, Gabbs, NV
Pamela Green, Hawthorne, NV
Bertha Guth, Gabbs, NV
Don Guth, Gabbs, NV
Pat Hannifen, Gabbs, NV
Bus Hedgcorth, Gabbs, NV
Jack McCloskey, Hawthorne, NV
Mike McConnell, Gabbs, NV
Mervyn McInnis, Hawthorne, NV
Almeda Meeks, Gabbs, NV
I.V. Meeks, Gabbs, NV
Larry Meeks, Gabbs, NV
O. Meheyk, Gabbs, NV
Rod Mercer, Gabbs, NV
Mel Molyneux, Hawthorne, NV
Don Nonella, Fallon, NV
Laura Peterson, Hawthorne, NV
Dan Peterson, Tonopah, NV
R. C. Phillips, Hawthorne, NV
Don Pressey, Gabbs, NV
L. Redman, Tonopah, NV
Lois Repp, Gabbs, NV
Louis Repp, Gabbs, NV
Alan Rice, Gabbs, NV
Glenda Roberson, Gabbs, NV
Cary Roberson, Gabbs, NV
Linda Rude, Gabbs, NV
Clinton Sadler, Gabbs, NV
Jim Schrack, Tonopah, NV
Delbert Schultz, Hawthorne, NV
Pat Sena, Pahrump, NV

L. Higgenbotham, Tonopah, NV
Meredith Hooper, Austin, NV
Rose Ann Hooper, Gabbs, NV
Chin Huala, Denver, CO
Dan Jenkins, Hawthorne
Shirley Kosch, Austin, NV
Everett LePaz, Gabbs, NV
Jim Loeppky, Gabbs, NV
Linda Loeppky, Gabbs, NV
Troy Madraso, Hawthorne, NV
H. R. Mayfield, Gabbs, NV
Mary Alice Shoemaker, Gabbs, NV
Dorsey Shoemaker, Gabbs, NV
Mrs. & Mrs. G. I. Smith, Hawthorne, NV
Freeman Stanton, Gabbs, NV
Dorothy Stanton, Gabbs, NV
Bette Stewart, Gabbs, NV
Maggie Tracey, Hawthorne, NV
Steve Wakefield, Gabbs, NV
Rod Wakefield, Gabbs, NV
R. J. Walker, Gabbs, NV
Karen Wilson, Schurz, NV

4.3 Comments on the Draft EA

Formal letters of comments on the Draft EA are reproduced on following pages, together with BLM responses to individual comments.

FMC Corporation

FMC

December 3, 1984

Mr. Leslie Monroe, Area Manager
Bureau of Land Management
Tonopah Resource Area
P. O. Box 911, Old Radar Base
Tonopah, NV 89049

Re: Draft Environmental Assessment
Paradise Peak Project

Dear Mr. Monroe:

The purpose of this letter is to provide comments on the draft environmental assessment prepared for the Paradise Peak project.

1-1 Regarding Section 1.4, "Alternatives Eliminated from Detailed Consideration." Additional alternatives were considered and eliminated prior to the submission of the plan of operations. These alternatives considered plant location, access road location, waste dump location, and overall project configuration. The plant site was selected because of its proximity to the mine. This site reduces the length of the haul road required to move the ore from the mine to the mill. Other plant locations would not have significantly different environmental impacts so the location that minimized surface disturbance and haulage distance was chosen. The same is true for the access road to the processing facility. The access road was chosen to provide the most direct access from the existing Poleline road to the plant site. Here again, the selection minimizes surface disturbance and costs while not increasing environmental affects.

1-2 Reference 3.1, "Air Resources." The footnote to Table 3-1 on page 3-2, says that fugitive dust emissions are not reasonably quantifiable and that there are no mining emission factors for hardrock mining operations. FMC

1-1 This information has been added to Chapter 1 of the EA.

1-2 We agree. The referenced footnote has been further clarified.

1-3 agrees with that comment and further suggests that because of a lack of emission factors and lack of models in estimating their impacts, the quantification of those emissions should not be interpreted as concrete numbers. Also, on page 3-1, it states that impacts of particulate matter from mining operations are not specifically regulated by the NDEP. FMC is required to obtain a permit from the Nevada Department of Environmental Protection specifically covering those particulate matter emissions and imposing control requirements for fugitive dust. FMC currently has this permit in hand. Also enclosed is a copy of an ERT report dated April 1981, which establishes that there are no reasonable emissions factors for surface mines to further support the comment that particulate matter emissions must be carefully interpreted.

1-4 Regarding Section 3.11, "Socioeconomics," FMC has taken steps to reduce the possible effects of a projected housing shortage. FMC has met with local landowners, builders, and developers who are interested in supplementing the housing supply in Hawthorne. As a result of these meetings, eight new apartment units are currently under construction in Hawthorne. Four of these units are supported by rental guarantees provided by FMC. FMC has received and is evaluating a proposal from another developer seeking support for an additional four-unit apartment complex. FMC will support this development if the plans seem appropriate. A proposal for a larger apartment complex, consisting of 20-30 units, is being prepared and will be received before the end of the year. Again, if this is a legitimate proposal, FMC would be willing to support the development of this larger apartment complex. In addition to supporting the construction of rental units, FMC is purchasing and installing double-wide trailers for the use of FMC employees, either on a permanent or temporary basis. In addition, FMC has negotiated to acquire land in Gabbs from C E Basic, that can be used for the development of mobile home facilities, if the demand warrants.

1-5 Reference 3.13, page 3-49, FMC Corporation is required to comply with applicable federal and state regulations and laws. It is not necessary that all other permits

LETTER 1 (Continued)

1-3 The section in Chapter 3 was revised to clarify the requirements of NDEP air quality permitting. A permit is required for surface disturbances. Dispersion modeling of those disturbances is not required.

1-4 FMC's efforts to encourage private developers to provide new housing are a very important means of limiting adverse effects. The projected housing shortage was based on a worst-case analysis which assumed no new housing would be developed.

1-5 Comment noted. BLM is coordinating with state agencies to ensure their requirements are met.

be in hand prior to BLM approval of the plan of operations. FMC has submitted applications to state agencies for other necessary permits and will comply with the permit conditions imposed by other agencies.

Sincerely,

Donald L. Beckwith
Manager, Minerals Development

DLB:bjp
Enclosures

LETTER 1 (Continued)

Board of Mineral County Commissioners

P. O. BOX 1467
HAWTHORNE, NEVADA 89415

HARRY L. POE, Chairman
DONALD F. BEEVERS, Vice Chairman
ALLEN E. CONELLY, Member

Governing Board for the Towns of Hawthorne, Luning and Mina
LIQUOR BOARD
GAMING BOARD

November 21st., 1984.

Mr. Leslie Monroe, Area Manager
Bureau of Land Management
Tonopah Resource Area
P. O. Box 911, Old Radar Base
Tonopah, Nevada 89049

Re: Draft Environmental Assessment FMC Corporation's Proposed Paradise Peak Project.

Dear Mr. Monroe:

During the meeting of the Board of Mineral County Commissioners held on Wednesday, November 14th., 1984, a Draft Environmental Assessment, FMC Corporation's Proposed Paradise Peak Project, prepared by US Department of the Interior, Bureau of Land Management, Tonopah Resource Area, with the Assistance of Environmental Research and Technology, Inc., 1716 Heath Parkway, Fort Collins, Colorado, was presented.

Thereafter, the Board, by unanimous action, advised that they had reviewed the impact study and interposes no objections.

Very truly yours;

BOARD OF MINERAL COUNTY COMMISSIONERS

BY _____
CLERK OF THE BOARD.

4-12

LETTER 3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

November 30, 1984

Mr. Leslie Monroe
Area Manager
Bureau of Land Management
Tonopah Resource Area
P.O. Box 911, Old Radar Base
Tonopah, NV 89049

Dear Mr. Monroe:

EPA has reviewed the Draft Environmental Assessment (EA) for the Paradise Peak Project, Nye County, Nevada. We have the enclosed comments to offer regarding this project.

We appreciate the opportunity to review this document. Please send us three copies of the Final EA when it is available. If you have any questions please call Roberta Blank at (415) 974-8187 or FTS 454-8187.

Sincerely yours,

Loretta Kahn Barsamian

Loretta Kahn Barsamian, Chief
Federal Activities Branch

Enclosure (1)

4-13

Comments - Paradise Peak Project

1. We recommend selection of Reclamation Alternative C in order to avoid the effects of wind and water erosion on the disturbed acreage. The Final EA should provide a comparative analysis of erosion related impacts under Reclamation Alternative B versus C.

2. We would appreciate inclusion of the following information in the Final EA:

3-1 a. A description of the disposal method for spillage and runoff from the mill area after it enters the lined sediment pond. Also, a description of the liner permeability and monitoring system for this pond should be included.

3-2 b. The monitoring and recovery system for leachate from the tailings pond should be described in greater detail.

3-3 c. The Draft EA states that "It is probable that no contamination would be detected in saturated ground-water zones over the life of the project." The Final EA should discuss migration of contaminants after the life of the project. Since open fractures are still possible, a more thorough geotechnical investigation may be warranted.

3-4 d. The Final EA should provide greater detail regarding the impacts associated with ground water withdrawls.

LETTER 3 (Continued)

3-1 Accidental spills in the mill area would drain either to floor sumps or to the sedimentation pond. These fluids may contain precious metals and would be pumped back into the process stream. Runoff collected in the sedimentation pond is expected to be in small quantities. It would evaporate from the pond or be pumped into the makeup water stream if necessary. The sedimentation pond would be lined with 40 mil high-density polyethelene which has a laboratory permeability on the order of 1×10^{-11} centimeters per second. There is no monitoring proposed for the sedimentation pond since it is used only for leak recovery and not for storage or disposal.

3-2 The groundwater monitoring and recovery system for the tailings impoundment is conceptual at this time and subject to the provisions of a Water Pollution Control Permit to be issued by the Nevada Division of Environmental Protection (see Groundwater Mitigation Measure 2). The conceptual system would involve monitoring water levels and water quality in deep saturated volcanic bedrock and shallow unsaturated alluvium. Monitoring wells would be constructed to serve as pump-back wells in the event of groundwater contamination.

3-3 The potential migration of groundwater contaminants after project closure are the same as those described on pages 3-11 and 3-12 of the DEA which apply to the operational life of the project. The long term potential for contaminant migration from the tailings impoundment is less than during operation, however, because water will no longer be added to the impoundment and natural recharge is very low. The misleading phrase "over the life of the project" has been deleted.

3-4 The analysis of groundwater drawdown impacts associated with project water supply withdrawls is sufficiently detailed to evaluate environmental consequences. Data are not available for a more detailed analysis. Groundwater Mitigation Measure 1 provides for implementation of a drawdown monitoring program during project operation. Existing senior water rights are protected from loss or reduction of use through the Nevada State Engineer's Office.

UNITED STATES GOVERNMENT

Memorandum

FMC

FISH AND WILDLIFE SERVICE
GREAT BASIN COMPLEX
4600 Kietzke Lane, Building C
Reno, Nevada 89502

RECEIVED
BUREAU OF LAND MANAGEMENT
DEC 05 1984
TONOPAH RESOURCE AREA OFFICE

DATE November 21, 1984

TO Tonopah Resource Area Manager
Bureau of Land Management, Tonopah, Nevada

FROM Acting Complex Manager
Reno, Nevada

SUBJECT Draft FMC Paradise Peak Environmental Assessment Comments

We have reviewed the draft Paradise Peak Environment Assessment and would like to offer the following recommendations:

4-1 1) The Land Sale Alternative should be eliminated. In the long term, this is not in the best interest of wildlife.

4-2 2) Should this mine be developed, Reclamation Alternative C is the obvious choice to restore public values including wildlife habitat. To assure satisfactory results, it is suggested that restoration be an ongoing process. Waste areas would be covered with topsoil and revegetated incrementally during the life of the project. This would allow opportunity to experiment, to keep restoration as priority activity and to minimize wildlife losses over time.

4-3 3) When selecting revegetation species and distribution patterns, we recommend that wildlife habitat enhancement be considered.

4-4 4) We support wildlife mitigation measures 1 and 2 on page 3-41 and the construction of a "raptor proof" transmission line as described on page 3-19.

4-15

cc: Nevada Dept. of Wildlife, Reno, Fallon

4-1 BLM has deferred a decision on the Land Sale Alternative until a specific proposal is received from FMC.

4-2 An experimental revegetation program has been incorporated in the Final EA as a mitigation measure.

4-3 Comment noted.

4-4 Comment noted.

LETTER 3 (Continued)

3-1

3-2

4-4

4-5

LETTER 5

STATE OF NEVADA

RICHARD H. BRYAN
Governor

LINDA A. RYAN
Director

STATE OFFICE OF COMMUNITY SERVICES

Capitol Complex
Carson City, Nevada 89710
(702) 885-4420

November 26, 1984

Leslie A. Monroe
Area Manager
Bureau of Land Management
Tonopah Resource Area
P.O. Box 911
Tonopah, Nevada 89049

Re: SAI NV #85300022 Project: Paradise Peak DEIS

Dear Mr. Monroe:

Thank you for the opportunity to review the above mentioned project. Attached are Clearinghouse comments prepared by the Nevada Departments of Wildlife, Minerals, Transportation, and Employment Security, and the Divisions of Environmental Protection, Historic Preservation/Archeology, State Parks and State Lands. Also attached are comments from the Public Service Commission and the UNR Bureau of Mines.

These comments constitute the State Clearinghouse review of the Draft Environmental Assessment (DEA). Please forward the final EA for our review and comment.

Sincerely,

John B Walker

John B. Walker, Coordinator
State Clearinghouse, OCS/SPOC

JBW/ll
Enclosures
cc: Tom Shoemaker, FRT

4-16

RICHARD H. BRYAN
Governor

STATE OF NEVADA

RICHARD L. HEYBURN
Director

DEPARTMENT OF MINERALS
400 W. King Street, Suite 106
Carson City, Nevada 89710
(702) 885-5050

November 14, 1984

JOHN WALKER
State Clearinghouse Coordinator
State Office of Community Services
Captiol Complex
Carson City, NV 89710

RE: Paradise Peak DEIS
SAI NV #85300022

Dear Mr Walker:

4-17

The Nevada Department of Minerals appreciates the opportunity to comment on the FMC Draft Environmental Statement for the Paradise Peak Project.

The Department of Minerals recognizes the critical role of minerals to our economy, national defense and standard of living. Public welfare is promoted by the increased prosperity which necessarily results from developing the natural resources of the country. FMC's Paradise Peak Project will certainly provide important economic and social benefits to central Nevada, the state and the nation.

Mining in Nevada has been furthered tremendously by a cooperative government and supportive public. Gabbs and many surrounding communities were founded on mining and the area remains a hub of mining activity. Few areas in Nevada boast a more informed and involved public when it comes to recognizing the importance of mining.

We have reviewed with interest FMC's "Plan of Operation for the Paradise Peak Project" and the environmental assessment document prepared by Environmental Research and Technology, Inc. It is obvious to us that FMC is impressively and professionally addressing the important issues of environmental impact, as well as a host of other subjects too numerous to mention here.

As is often the case, the success rate for a business venture is directly proportional to the quality of planning which precedes it. Given this, combined with the well documented, economically favorable geologic characteristics of the ore body, it seems certain that the Paradise Peak Project will be a success. The Department of Minerals thusly takes this opportunity to congratulate FMC on their discovery and voice our strong support for the expedient development of the Paradise Peak Project.

Sincerely,

Paul J. Iverson
Deputy Director

PJI:wf

LETTER 5 (Continued)

STATE OF NEVADA
DEPARTMENT OF WILDLIFE
1100 Valley Road
P.O. Box 10678
Reno, Nevada 89520-0022
(702) 789-0500

RICHARD H. BRYAN
Governor

WILLIAM A. MOLINI
Director

November 16, 1984

Ms. Linda A. Ryan, Director
Office of Community Services
1100 E. William, Suite 109
Carson City, NV 89710

Dear Linda:

Thank you for the opportunity to review the Paradise Peak project environmental assessment (SAI NV #85300022). We have reviewed the document with regard to wildlife values and offer the following comments.

We have no objection to the project as described and find no significant wildlife conflicts. We would like to encourage the operators to stockpile the topsoil and to use that topsoil for rehabilitation at project closure.

Our personnel have found this EA to be especially complete, thorough, and well prepared, and we wish to congratulate the preparers for their good work. If we can answer any questions or provide additional input, please let us know.

Sincerely,

William A. Molini
Director

FRK:pw

cc: Region III

STATE CLEARINGHOUSE

OFFICE OF COMMUNITY SERVICES
1100 EAST WILLIAM, SUITE 100
CARSON CITY, NEVADA 89710
(702) 885-4420

TO:

- __ Governor's Office
- __ Attorney General
- __ Administration
- __ Agriculture
- __ Commerce
- __ Community Services
- X State Job Training Office
- __ Economic Development
- __ Education
- X Employment Security Department
- X Dept. of Minerals
- __ Equal Rights Commission
- __ Human Resources
- __ Indian Commission
- __ Labor Commission
- X Legislative Counsel Bureau
- __ Library
- __ Prisons
- X Public Service Commission
- __ Taxation
- X Transportation
- X UNR-Bureau of Mines
- __ UNR-Dept. of Range, Wildlife, and Forestry
- X Wildlife
- __ Press Room-Capitol Building
- __ Nuclear Waste Project Office
- __ _____
- __ _____

Conservation and Natural Resources

- X State Lands
- __ Conservation Districts
- X Environmental Protection
- __ Forestry
- X [redacted] & Archaeology
- X State Parks
- X Water Planning
- X [redacted]

RECEIVED
NOV 3 1 1984
Division of Historic Preservation and Archaeology

FROM: Linda A. Ryan, Director

SAI NV # 85300022 PROJECT: Paradise Peak DEIS

Attached for review and comment is a copy of the aforementioned project. Please evaluate it with respect to:

1) the program's effect on your plans and programs;
2) the importance of its contribution to State and/or areawide goals and objectives;
3) its accord with any applicable law, order or regulation with which you are familiar and/or
4) additional considerations.

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4-20

THIS SECTION TO BE COMPLETED BY REVIEWING AGENCY:

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- __ Additional information (see below)
- __ Conference desired (see below)
- __ Conditional support (outlined below)
- __ Disapproval/denial of funding (must specify reason below)

Comments: (use additional sheets if necessary)

5-1 When the testing and evaluation program is completed, the cultural resources report with recommendations should be forwarded to this office for review. According to the progress reports submitted by Archaeological Research Services, one site, PP24, is significant and eligible for inclusion in the National Register. Although not subject to direct impact, its highly visible nature will make it vulnerable to vandals and collectors.
As part of the testing report, recommendations for the protection of site PP24 will be necessary and must be agreeable to all parties, as well as satisfy existing federal preservation laws and regulations.
We will comment again on the effects of this project after the report is submitted for review.

Reviewer's Signature	Title	Phone	Date
Cilla M Becky	Staff Archeologist	(702) 885-5138	11/15/84

5-1 The final report will be submitted to the Division of Historic Preservation and Archaeology. BLM and FWC are working with the Division to develop a long-term management plan to protect the referenced site.

A. E. STONE
Director

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

1263 SOUTH STEWART STREET
CARSON CITY, NEVADA 89712

November 7, 1984

IN REPLY REFER TO

PSD 7.19

John Walker, Senior Planner
State Clearinghouse Review
Office of Community Services
1100 East William Street, Suite 109
Carson City, Nevada 89710

Dear John:

The Nevada Department of Transportation has reviewed the scoping document for SAI NV 85300022 - Paradise Peak Draft Environmental Assessment

Based on the information submitted, the proposed project is, as of this date, found not to be in conflict with the Department's plans or projects.

Thank you for the opportunity to review this project.

Sincerely,

DENNIS O. BARRY
Assistant Director
Planning

DOB:JRW:bb

LETTER 5 (Continued)

STATE CLEARINGHOUSE

OFFICE OF COMMUNITY SERVICES
1100 EAST WILLIAM, SUITE 109
CARSON CITY, NEVADA 89710
(702) 885-4420

TO:

- ___ Governor's Office
- ___ Attorney General
- ___ Administration
- ___ Agriculture
- ___ Commerce
- ___ Community Services
- X State Job Training Office
- ___ Economic Development
- ___ Education
- X Employment Security Department
- X Dept. of Minerals
- ___ Equal Rights Commission
- ___ Human Resources
- ___ Indian Commission
- ___ Labor Commission
- X Legislative Counsel Bureau
- ___ Library
- ___ Prisons
- X Public Service Commission
- ___ Taxation
- X Transportation
- X UNR-Bureau of Mines
- ___ UNR-Dept. of Range, Wildlife, and Forestry
- X Wildlife
- ___ Press Room-Capitol Building
- ___ Nuclear Waste Project Office
- ___ _____
- ___ _____

Conservation and Natural Resources

- X State Lands
- ___ Conservation Districts
- X Environmental Protection
- ___ Forestry
- X Hist. Preservation & Archeology
- X State Parks
- X Water Planning
- X Water Resources

FROM: Linda A. Ryan, Director

SAI NV # 85300022 PROJECT: Paradise Peak DEIS

Attached for review and comment is a copy of the aforementioned project. Please evaluate it with respect to:

1) the program's effect on your plans and programs;
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4-22

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- ___ Disapproval/denial of funding (must specify reason below)

Comments: (use additional sheets if necessary)

E V Bowles — Lit Mgt Analyst — 885-4645 — 11-9-84

Reviewer's Signature / Title / Phone / Date

STATE CLEARINGHOUSE

RECEIVED

NOV 1 1984

ENVIRONMENTAL PROTECTION

OFFICE OF COMMUNITY SERVICES
1100 EAST WILLIAM, SUITE 105
CARSON CITY, NEVADA 89710
(702) 885-4420

TO:

- __ Governor's Office
- __ Attorney General
- __ Administration
- __ Agriculture
- __ Commerce
- __ Community Services
- X State Job Training Office
- __ Economic Development
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- __ _____

Conservation and Natural Resources

- X State Lands
- __ Conservation Districts
- [redacted]
- __ Forestry
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FROM: Linda A. Ryen, Director

SAI NV # 85300022 PROJECT: Paradise Peak DEIS

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Comments: (use additional sheets if necessary)

AIR-Gay McCleary: Air quality applications for registration certificates for the Paradise Peak Project have been received and are currently being reviewed. The appropriate registration certificates and restrictions will probably be issued by the end of the year, to insure compliance with all applicable air pollution regulations.

WATER-Ralph Capurro: An application for this project has been received and will be issued a water pollution discharge permit. Site approval and construction approval have been given, by the Water Quality section, Mining sub-section.

WASTE-Verne Rosse: No comment.

L. V. Madgwick (kgr) Administrator 885-4670 11/16/84

Reviewer's Signature / Title / Phone / Date

4-23

STATE CLEARINGHOUSE

OFFICE OF COMMUNITY SERVICES
1100 EAST WILLIAM, SUITE 109
CARSON CITY, NEVADA 89710
(702) 885-4420

TO:

- ___ Governor's Office
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Conservation and Natural Resources

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- X Water Resources

FROM: Linda A. Ryan, Director

SAI NV # 85300022 PROJECT: Paradise Peak DEIS

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4-24

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Comments: (use additional sheets if necessary)

The Nevada Division of State Parks supports the proposal under the terms of the BLM's preferred alternatives. There are no adverse impacts to State Parks or recreation.

John Richardson

John Richardson, Administrator
Nevada Division of State Parks

Reviewer's Signature | Title | Phone | Date

Wayne R. Clark | Park Ranger V | 867-3011 | 11/7/84

LETTER 5 (Continued)

STATE CLEARINGHOUSE

PLW
SES
JVD
MH
JHM
LM
KAM
TECH
FILE
OTHER

OFFICE OF COMMUNITY SERVICES
1100 EAST WILLIAM, SUITE 109
CARSON CITY, NEVADA 89710
(702) 885-4420

TO:

- ___ Governor's Office
- ___ Attorney General
- ___ Administration
- ___ Agriculture
- ___ Commerce
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- X State Job Training Office
- ___ Economic Development
- ___ Education
- X Employment Security Department
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...IV OF LANDS-

1 NOV 84 10:18

FROM: Linda A. Ryan, Director

SAI NV # 85300022 PROJECT: Paradise Peak DEIS

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Comments: (use additional sheets if necessary)

Reviewer's Signature | LAND USE PLANNER Title | 885-4363 Phone | 11-2-84 Date

4-25

STATE CLEARINGHOUSE

OFFICE OF COMMUNITY SERVICES
1100 EAST WILLIAM, SUITE 109
CARSON CITY, NEVADA 89710
(702) 885-4420

TO:

__ Governor's Office	__ Labor Commission	Conservation and Natural Resource
__ Attorney General	X Legislative Counsel Bureau	
__ Administration	__ Library	
__ Agriculture	__ Prisons	X State Lands
__ Commerce	[redacted]	__ Conservation Districts
__ Community Services	__ Taxation	X Environmental Protection
X State Job Training Office	X Transportation	__ Forestry
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__ Education	__ UNR-Dept. of Range, Wildlife,	& Archeology
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__ Indian Commission	__ _____	
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FROM: Linda A. Ryan, Director

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Comments: (use additional sheets if necessary)

PUBLIC SERVICE COMMISSION OF NEVADA RECEIVED NOV 01 1984

Reviewer's Signature | Water Engineer (Title) | 885-5134 (Phone) | 11/1/84 (Date)

4-26

LETTER 5 (Continued)

STATE CLEARINGHOUSE

OFFICE OF COMMUNITY SERVICES
1100 EAST WILLIAM, SUITE 108
CARSON CITY, NEVADA 89710
(702) 885-4420

TO:

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FROM: Linda A. Ryan, Director

SAI NV # 85300022 PROJECT: Paradise Peak DEIS

4-27

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Comments: (use additional sheets if necessary)

J. W. Turnipseed — Reviewer's Signature
Geologist, NDWR — Title
789-6691 — Phone
11/15/84 — Date

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APPENDIX A

VISUAL CONTRAST RATING WORKSHEETS

VISUAL RESOURCE MANAGEMENT CLASSES

Class I -	This class primarily provides for natural ecological changes only. It is applied to primitive areas, some natural areas, and other similar situations where management activities are to be restricted.
Class II -	Changes in any of the basic elements (form, line, color, or texture) caused by a management activity should not be evident in the characteristic landscape.
Class III -	Changes in the basic elements (form, line, color, texture) caused by a management activity may be evident in the characteristic landscape. However, the changes should remain subordinate to the visual strength of the existing character.
Class IV -	Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.
Class V -	Change is needed. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside. This class would apply to areas identified in the scenery evaluation where the quality class has been reduced becuase of unacceptable intrusions. It should be considered an interim short-term classification until one of the other objectives can be reached through rehabilitation or enhancement. The desired visual quality objective shoudl be identified.

Source: BLM Manual 8411.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/27/84
District Battle Mtn.
Planning unit Tonopah R.A.
Activity Mine; Processing Plant

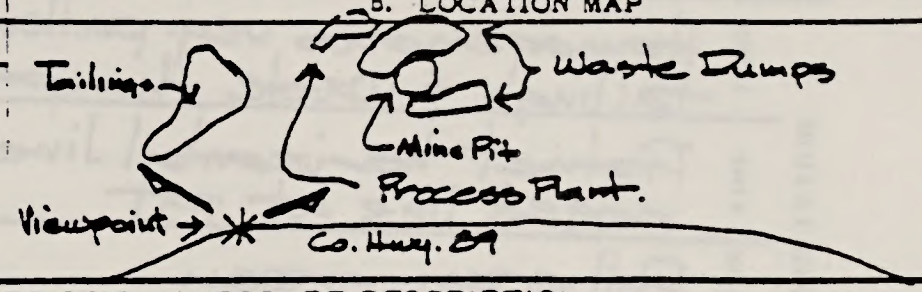
SECTION A. PROJECT INFORMATION

1. Project name	2. Critical viewpoint number	3. MFP Step III VRM class
Paradise Peak Project	1	IV

4a. LOCATION

TOWNSHIP	RANGE	SECTION

b. LOCATION MAP



SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

1. LAND/WATER	FORM	Rounded conical hills, moderate slopes; backed by ridge of hills w/rounded tops, moderate to steep slopes; rounded valleys
	LINE	Curvilinear; some angularity but with curvilinear intersection
	COLOR	Dull brown on ridge tops; some streaks of grey and beige
	TEXTURE	Smooth to fine
2. VEGETATION	FORM	Vegetation appears as texture more than form, nearly flat against the land
	LINE	Not distinct, feathered where veg. gives way to nearly barren ground on ridges; also feathered between sage & grass in valleys. ~~Distinct geometric lines of roads~~
	COLOR	Grey-green, dull
	TEXTURE	Medium-fine
3. STRUCTURES	FORM	
	LINE	NONE
	COLOR	
	TEXTURE	

(Continued on page 2)

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SECTION C. PROPOSED ACTIVITY DESCRIPTION

(Refer to BLM Manual Section 8131 for proposed descriptions and requirements)

1. LAND/WATER	FORM	Flat, rectilinear, ~~steeply~~ angled side slopes; ridgeline horizon remains unchanged
	LINE	Straight; horizontal
	COLOR	~~Light~~, beige; greys
	TEXTURE	Smooth
2. VEGETATION	FORM	Homogenous veg. pattern broken by rectilinear tailings & waste dumps
	LINE	Distinct horizontal line at tailings & waste piles & roads; jagged line at pit
	COLOR	Dull grey-green
	TEXTURE	Medium fine
3. STRUCTURES	FORM	Horizontal rectangular; low, vertical cylindrical; conical
	LINE	Horizontal, ~~straight~~ & rounded
	COLOR	Greys & browns
	TEXTURE	Smooth

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

ELEMENTS	DEGREE OF CONTRAST	FEATURES: LAND/WATER BODY (1) Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	VEGETATION (2) Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	STRUCTURES (3) Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
	Form (4x)	12	8	(4)	0	12	(8)	4	0	12	8	(4)	0
	Line (3x)	9	(6)	3	0	9	(6)	3	0	9	6	(3)	0
	Color (2x)	(6)	4	2	0	6	(4)	2	0	6	(4)	2	0
	Texture (1x)	3	2	1	(0)	3	2	1	(0)	3	2	1	(0)
	TOTALS	16				18				11			

1a. Maximum element contrast: None specified (Class III)

b. Maximum feature contrast: 20 (Class IV)

2. Does project design meet visual resource management requirements? ☒ Yes ☐ No

If "no," (or if rating is over maximum allowable) redesign project in section E, concentrating on feature/element of greatest contrast. If contrast is acceptable, this does not prelude additional mitigating measures; propose as stipulations, and list in section E.

Evaluator (signature): Barbara Brown Date: 8/27/82

SECTION E. REDESIGN, STIPULATIONS, MITIGATING MEASURES

Suggest consideration of recontouring to reduce form/line contrast and revegetation of waste dumps and tailings dam to reduce color contrast.

SECTION F. DESCRIPTION OF ACTIVITY (Redesigned)

		FORM	LINE	COLOR	TEXTURE
1. LAND/WATER					
2. VEGETATION					
3. STRUCTURES					

(Continued on page 4)

SECTION G. CONTRAST RATING (Redesigned)

DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
ELEMENTS	Form (4x)	12	8	4	0	12	8	4	0	12	8	4	0
	Line (3x)	9	6	3	0	9	6	3	0	9	6	3	0
	Color (2x)	6	4	2	0	6	4	2	0	6	4	2	0
	Texture (1x)	3	2	1	0	3	2	1	0	3	2	1	0
	TOTALS												

1a. Maximum element contrast

b. Minimum feature contrast

2. Does project design meet visual resource management requirements? ___ Yes ___ No

If "no," request services of district landscape architect, and describe amount of time and when required.

3. Fiscal year 19

4. Which third? *(check one)*

___ First ___ Second ___ Third

5. TIME REQUIRED

DAYS	MAN-MONTHS

SECTION H. RECOMMENDATIONS

1. Recommendation of staff landscape architect if allowable contrast rating cannot be met

Signature	Date

2. Decision and justification of Area or District Manager

Signature	Date

3. Check appropriate box: ___ Proceed with project/activity as mitigated ___ Cancel project/activity as proposed

Signature	Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/27/84

District Battle Mtn.

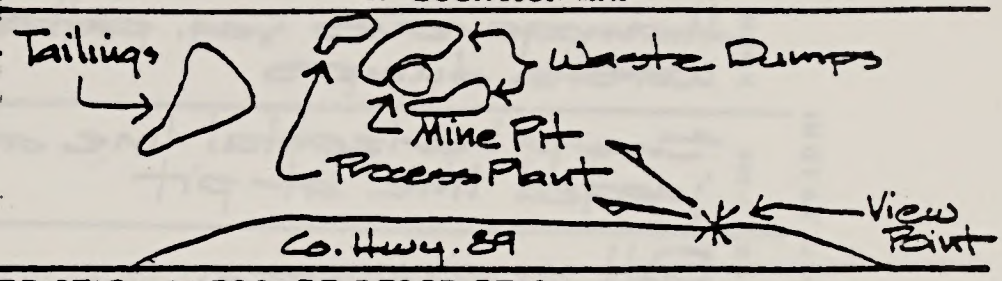
Planning unit Tonopah R.A.

Activity Mine; Processing Plant

SECTION A. PROJECT INFORMATION

1. Project name	2. Critical viewpoint number	3. MFP Step III VRM class
Paradise Peak Project	2	IV

4a. LOCATION			b. LOCATION MAP
TOWNSHIP	RANGE	SECTION	



SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

1. LAND/WATER	FORM	Rounded conical hills, moderate slopes; backed by ridge of hills, w/rounded tops, moderate to steep slopes; rounded valleys
	LINE	Curvilinear; some angularity but with curvilinear intersection
	COLOR	Dull brown on ridge tops; streaks of grey & beige
	TEXTURE	Smooth to fine
2. VEGETATION	FORM	Vegetation appears as texture more than form; nearly flat against the land
	LINE	Not distinct, feathered where veg. gives way to nearly barren ground on ridges; sharp horizontal lines at roads
	COLOR	Dull grey-green
	TEXTURE	Medium fine
3. STRUCTURES	FORM	
	LINE	None
	COLOR	
	TEXTURE	

(Continued on page 2)

Form 8400—4 (September 1978)
U.S. Government Printing Office - 78-779-312

SECTION C. PROPOSED ACTIVITY DESCRIPTION

(Refer to BLM Manual Section 8131 for proposed descriptions and requirements)

1. LAND/WATER	FORM	Flat; rectilinear, ~~steeply angled side slopes~~; ridgeline horizon remains unchanged
	LINE	straight; horizontal
	COLOR	Light beige; greys
	TEXTURE	Smooth
2. VEGETATION	FORM	~~Homogenous veg. pattern broken by~~ rectilinear waste dumps
	LINE	sharp horizontal line at waste dumps & roads; jagged line at pit
	COLOR	Dull grey-green
	TEXTURE	Medium fine
3. STRUCTURES	FORM	~~Horizontal~~ rectangular; low, vertical cylindrical; conical
	LINE	~~Horizontal~~, straight & rounded
	COLOR	Greys & browns
	TEXTURE	Smooth

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

DEGREE OF CONTRAST	FEATURES: LAND/WATER BODY — Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	VEGETATION (2) — Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	STRUCTURES (3) — Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
ELEMENTS: Form (4x)	12	(8)	4	0	12	(8)	4	0	12	8	(4)	0
Line (3x)	9	(6)	3	0	9	(6)	3	0	9	6	(3)	0
Color (2x)	(6)	4	2	0	6	(4)	2	0	6	(4)	2	0
Texture (1x)	3	2	1	(0)	3	2	1	(0)	3	2	1	(0)
TOTALS		20				18				11		

1a. Maximum element contrast: None specified (Class IV)

b. Maximum feature contrast: 20 (Class IV)

2. Does project design meet visual resource management requirements? ☒ Yes ☐ No

If "no," (or if rating is over maximum allowable) redesign project in section E, concentrating on feature/element of greatest contrast. If contrast is acceptable, this does not preclude additional mitigating measures; propose as stipulations, and list in section E.

Evaluator (signature) [signature] Date 8/27/84

SECTION E. REDESIGN, STIPULATIONS, MITIGATING MEASURES

Suggest consideration of recontouring to reduce form/line contrast and revegetation of waste dumps and tailings dam to reduce color contrast.

SECTION F. DESCRIPTION OF ACTIVITY (*Redesigned*)

		LAND/WATER			2. VEGETATION			3. STRUCTURES		
		FORM	LINE	COLOR	TEX-TURE	FORM	LINE	COLOR	LINE	TEX-TURE

(Continued on page 4)

SECTION G. CONTRAST RATING (Redesigned)

DEGREE OF CONTRAST	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)	Strong (3x)	Moderate (2x)	Weak (1x)	None (0x)
ELEMENTS: Form (4x)	12	8	4	0	12	8	4	0	12	8	4	0
Line (3x)	9	6	3	0	9	6	3	0	9	6	3	0
Color (2x)	6	4	2	0	6	4	2	0	6	4	2	0
Texture (1x)	3	2	1	0	3	2	1	0	3	2	1	0
TOTALS												

1a. Maximum element contrast

b. Minimum feature contrast

2. Does project design meet visual resource management requirements? ___ Yes ___ No

If "no," request services of district landscape architect, and describe amount of time and when required.

3. Fiscal year 19

4. Which third? *(check one)*

___ First ___ Second ___ Third

5. TIME REQUIRED

DAYS	MAN-MONTHS

SECTION H. RECOMMENDATIONS

1. Recommendation of staff landscape architect if allowable contrast rating cannot be met

Signature	Date

2. Decision and justification of Area or District Manager

Signature	Date

3. Check appropriate box: ___ Proceed with project/activity as mitigated ___ Cancel project/activity as proposed

Signature	Date